

# AI AUTOMOTIVE INDUSTRIES

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ENGINEERING • PRODUCTION • MANAGEMENT

FEBRUARY 1, 1951

## *In This Issue . . .*

**Chrysler 100 Hp V-8 Engine**

**Impact of Army Contracts**

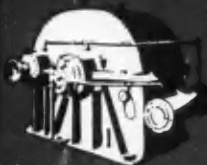
**Hydraguide Power Steering Gear**

**Studebaker V-8 Production**

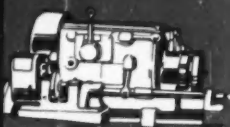
**Vibration Control Mounts**

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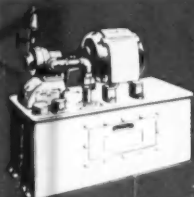
A CHILTON PUBLICATION



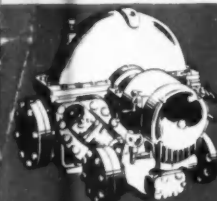
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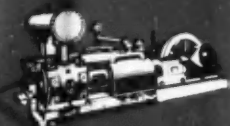
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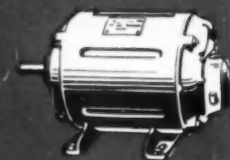
**HYDRAULIC SYSTEM**



**AUXILIARY TURBINE**



**COMPRESSOR**



**MOTORS**

# *Now better than ever*

# NEW

**Brings two new benefits  
to wide range of jobs**

For 14 years, STANOIL Industrial Oils have proved their ability to handle a wide variety of jobs in midwest plants. Now, these established products have been made better than ever! They offer these new and important savings in an even wider variety of industrial equipment.

**STANOIL**  
TRADE MARK  
**Industrial Oil**

## **1 LONGER OIL LIFE**

Because they have greater oxidation stability, the new STANOILS stand up under high temperatures of operation, maintain low acidity for longer periods of service which helps keep oil systems free from deposits caused by oil oxidation.

## **2 GREATER PROTECTION against RUST**

A corrosion inhibitor of the most advanced type has been added to all grades of the new STANOILS that benefit by such an additive. This inhibitor prevents corrosion trouble by "plating out" on surfaces that tend to rust. In such severe service as paper-machine and steam-turbine lubrication, new STANOILS have put an end to rust and corrosion troubles.

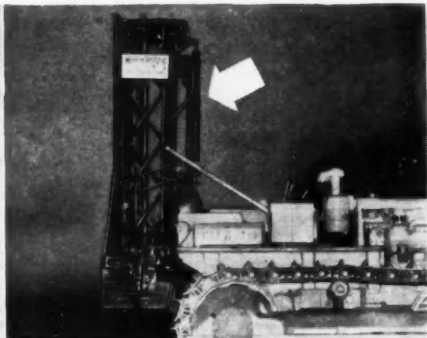
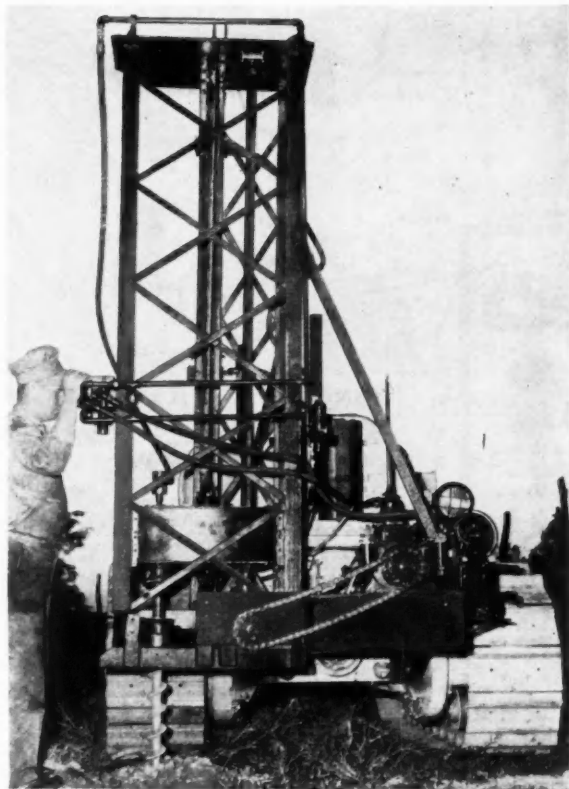
At the left are shown several types of equipment in which the new STANOILS can save you money and maintenance time. A Standard Oil lubrication specialist will help you find still other applications where versatile STANOILS can replace many special-purpose oils. You can reach this man quickly and easily through your local Standard Oil Company (Indiana) office. Contact him today. Or, if you wish, write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.



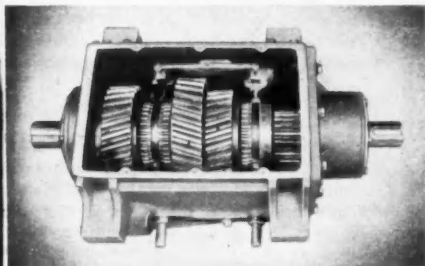
**STANDARD OIL COMPANY (INDIANA)**



# Mobile drill for seismic surveys in Canadian wilds requires transmission that can "take it"!



Mobile drill is mounted on "cat" to overcome transportation hazards in rough country, from mountain ranges to "muskeg" filled bogs under severest extremes of weather conditions.



Precision-designed, four-speed, constant-mesh, Cotta Transmission gives gear-box stamina necessary to control drilling speeds for a wide range of work under extreme conditions.

Nature gives this mobile drill a real "torture test"! Built by Mobile Drilling, Incorporated of Indianapolis, Indiana, the drill is used for seismograph work, locating minerals, checking foundations, taking soundings, drilling shallow wells. It must be ready to go anywhere, at any time, drilling with or without the use of water. It must be able to operate under all types of weather and terrain conditions—in sub-zero temperatures, in "muskeg" filled swamps. Its proved stamina has made the unit a growing favorite with geologists, highway engineers, contractors, soil testers, mine owners. The Drilling Unit has a heavy-duty

**COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS**

"Engineered-to-order" Cotta Transmission mounted in parallel with the drill to minimize cantilever overhang. When you need a gear-box with special characteristics for unusually tough jobs, come to . . .



## **COTTA**

**HEAVY-DUTY  
TRANSMISSIONS**

**PRECISION-BUILT • SPECIALLY  
ENGINEERED FOR YOUR PRODUCT**



## Counsel Offered ON METAL PROBLEMS

Because of unusually heavy industrial and defense demand, rationing of nickel has been in force since July 1st. On January 1, 1951, National Production Authority Order M-14, respecting the consumption of primary nickel, went into effect.

We shall continue to issue information on new developments and user experience with nickel-containing materials as we believe that dissemination of technical data and service experience can help to promote the intelligent utilization of critical materials, so essential in these times.

### "INCO" TECHNICAL SECTIONS

Consultation on technical problems relating to alloys containing nickel is invited. Consult the nearest Technical Field Section of INCO Development and Research Division listed below:

- |  |  |
|--|--|
| <b>CANADIAN SECTION</b><br>25 King Street, West,<br>Toronto 1, Ont.<br>Tel. Elgin 7471                 | <b>NEW ENGLAND SECTION</b><br>78 Pearl Street<br>Hartford 3, Conn.<br>Tel. Hartford 7-0353         |
| <b>CENTRAL ATLANTIC COAST SECTION</b><br>87 Wall Street,<br>New York 5, N. Y.<br>Tel. Whitehall 4-1000 | <b>PITTSBURGH SECTION</b><br>Grant Building<br>Pittsburgh 19, Pa.<br>Tel. Atlantic 1-3946          |
| <b>CHICAGO SECTION</b><br>323 N. Michigan Avenue,<br>Chicago 1, Ill.<br>Tel. Franklin 2-4030           | <b>ST. LOUIS SECTION</b><br>Ambassador Bldg.,<br>St. Louis 1, Mo.<br>Tel. Gerardo 4197             |
| <b>CINCINNATI SECTION</b><br>Carew Tower,<br>Cincinnati 2, Ohio<br>Tel. Parkway 1531                   | <b>TEXAS SECTION</b><br>Commerce Bldg.,<br>Houston 2, Texas<br>Tel. Charlier 4234                  |
| <b>DETROIT SECTION</b><br>General Motors Building<br>Detroit 2, Mich.<br>Tel. Trinity 8-3436           | <b>TWIN CITIES SECTION</b><br>Northwestern Bank Bldg.,<br>Minneapolis 5, Minn.<br>Tel. Genera 0631 |
| <b>EMPIRE STATE SECTION</b><br>Genesee Valley Trust Bldg.,<br>Rochester 14, N. Y.<br>Tel. Locust 5884  | <b>WEST COAST SECTION</b><br>Petroleum Bldg.,<br>Los Angeles 15, Calif.<br>Tel. Prospect 3496      |

### STOCK AND SERVICE CENTERS FOR "INCO" PRODUCTS

The following are sources of supply for primary nickel for alloying purposes. Through casting specialists, they are prepared to offer technical service on the production of ferrous and non-ferrous castings containing nickel.

- |  |  |  |  |  |
|--|--|--|--|--|
| <b>ATLANTA 3</b><br>J. M. Tull Metal & Supply Co.<br>285 Marietta Street<br>Tel. Alpine 3071                           | <b>COLUMBUS 8, OHIO</b><br>Williams and Company, Inc.<br>851 Williams Avenue<br>Tel. Klondike 1623         | <b>KANSAS CITY 8, MO.</b><br>Steel Sales Corporation<br>2201 Grand Avenue<br>Tel. Victor 7270                  | <b>NEW YORK 14</b><br>Whitehead Metal Products<br>Company, Inc.<br>303 West 10th Street<br>Tel. Watkins 4-1500         | <b>SAN FRANCISCO 10</b><br>Pacific Metals Company, Ltd.<br>3100 Nineteenth Street<br>Tel. Mission 7-1104       |
| <b>BALTIMORE 17</b><br>Whitehead Metal Products<br>Company, Inc.<br>413 West North Avenue<br>Tel. Lafayette 2300       | <b>DALLAS 9</b><br>Metal Goods Corporation<br>6211 Cedar Springs Road<br>Tel. Elmhurst 2271                | <b>LOS ANGELES 21</b><br>Pacific Metals Company, Ltd.<br>1400 South Alameda Street<br>Tel. Prospect 0171       | <b>PHILADELPHIA 40</b><br>Whitehead Metal Products<br>Company, Inc.<br>1955 Hunting Park Avenue<br>Tel. Baldwin 9-3223 | <b>SEATTLE 4</b><br>Eagle Metals Company<br>4765 First Avenue, S.<br>Tel. Lander 9974                          |
| <b>BUFFALO 2</b><br>Whitehead Metal Products<br>Company, Inc.<br>254 Court Street<br>Tel. Cleveland 1475               | <b>DENVER 5</b><br>Metal Goods Corporation<br>Municipal Service Center<br>3713 at York<br>Tel. Arcoma 5891 | <b>MILWAUKEE 9</b><br>Steel Sales Corporation<br>2400 West Cornell Street<br>Tel. Hilltop 2-2020               | <b>PITTSBURGH 33</b><br>Williams and Company, Inc.<br>901 Pennsylvania Avenue<br>Tel. Cedar 1-8600                     | <b>SPOKANE 8</b><br>Eagle Metals Company<br>East 320 Trent Avenue<br>Tel. Madison 2419                         |
| <b>CAMBRIDGE 29, MASS.</b><br>Whitehead Metal Products<br>Company, Inc.<br>281 Albany Street<br>Tel. Townbridge 6-6600 | <b>DETROIT 10</b><br>Steel Sales Corporation<br>5151 Wesson Avenue<br>Tel. Tyler 6-3000                    | <b>MINNEAPOLIS 15</b><br>Steel Sales Corporation<br>529 South 7th Street<br>Tel. Nestor 6614                   | <b>PORTLAND 12, ORE.</b><br>Eagle Metals Company<br>2336 North Randolph Avenue<br>Tel. Tuxedo 5201                     | <b>SYRACUSE 4</b><br>Whitehead Metal Products<br>Company, Inc.<br>207 W. Taylor Street<br>Tel. Syracuse 2-0156 |
| <b>CHICAGO 23</b><br>Steel Sales Corporation<br>3248 South Pulaski Road<br>Tel. Bishop 7-7700                          | <b>EDMONTON, ALBERTA</b><br>Wilkinson Company, Ltd.<br>8411 103rd Street<br>Tel. 39326                     | <b>MONTREAL 1</b><br>Robert W. Bartram, Limited<br>155 Craig Street, West<br>Tel. University 3711              | <b>ST. LOUIS 10</b><br>Steel Sales Corporation<br>4565 McGuffey Avenue<br>Tel. Cedar 1-8600                            | <b>TOLEDO 2</b><br>Williams and Company, Inc.<br>650 East Woodruff Avenue<br>Tel. Adams 8101                   |
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**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET  
NEW YORK 5, N.Y.

# AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

Feb. 1, 1951

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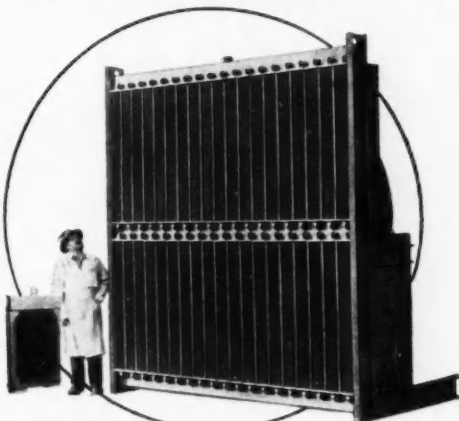
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AUTOMOTIVE INDUSTRIES, February 1, 1951

# RADIATORS

With

# STRENGTH OF STEEL!



## YOUNG "MONO-WELD" WELDED STEEL RADIATORS

Fabricated steel tanks and side-members, welded to shock-proof strength, give the Mono-Weld Radiator line by Young unusual ability to withstand the most rugged service. Ideal for heavy-duty gas, gasoline and Diesel engine cooling, sizes range from 2½' up to 10½' square, in single or multiple-section, replaceable-type cores. Compactness and durability make Mono-Weld Radiators particularly adaptable for portable equipment. You are invited to use the convenient coupon below for further details.

# YOUNG

Heat Transfer Products for  
Automotive and Industrial  
Applications.



Heating, Cooling, and Air  
Conditioning Products for  
Home and Industry.

**YOUNG RADIATOR CO., Dept. 101-B, Racine, Wis.**

Plants at Racine, Wisconsin and Matteson, Illinois

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COUPON FOR  
INSIDE STORY  
OF  
"MONO-WELD"  
ADVANTAGES

YOUNG RADIATOR COMPANY  
Dept. 101-B  
Racine, Wisconsin

I want to hear more about "Mono-Weld" Radiators. Rush me the full facts!

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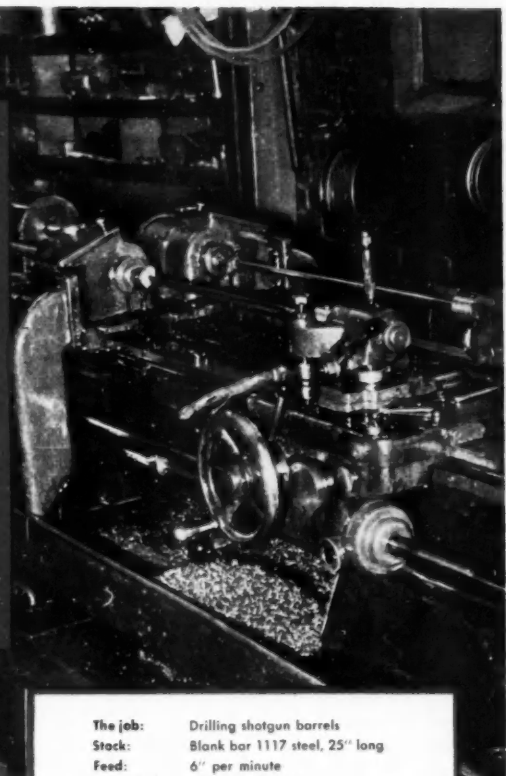
STATE \_\_\_\_\_

**THESE DRILLS  
NOW LAST UP  
TO 75%  
LONGER**

**Texaco Sultex  
Cutting Oil  
speeds the work,  
cuts the cost**

On this job\* Texaco was called in to see what could be done to overcome short tool life. With a competitive cutting fluid in the machine, drills were wearing badly and rounding over quickly. The Texaco Lubrication Engineer spotted the need for a totally different type of coolant and recommended *Texaco Sultex Cutting Oil* as best suited to the requirements of the metal being worked and the machining set-up.

As soon as *Texaco Sultex Cutting Oil* went into use, production between tool grinds increased 21 pieces for the smaller drill, 24 pieces for the larger



**The job:** Drilling shotgun barrels  
**Stock:** Blank bar 1117 steel, 25" long  
**Feed:** 6" per minute  
**Dia. of holes:** 0.395" and 0.595"  
**Speed:** 5000 rpm and 3600 rpm  
or 509 sfpm and 509 sfpm

—a 60% to 75% increase in tool life, with a corresponding reduction in down time for tool changes.

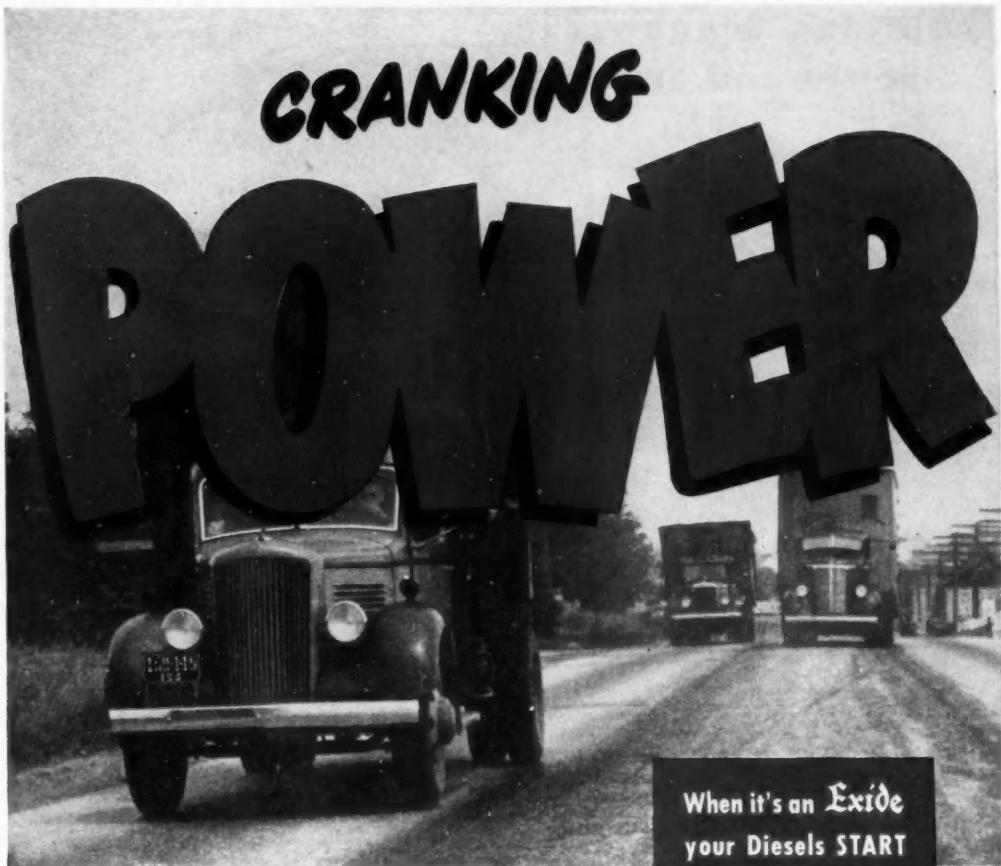
This is an excellent illustration of how the high quality of Texaco cutting fluids, combined with the practical know-how of Texaco Lubrication Engineers, assures better, faster, lower-cost machining—whatever the metal or the method of cutting it.

There is a complete line of Texaco Cutting, Grinding and Soluble Oils. A Texaco Lubrication Engineer specializing in machining operations will gladly help you select the right ones for best results in your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

\*Name of this Texaco user on request.



**TEXACO CUTTING, GRINDING AND  
SOLUBLE OILS FOR FASTER  
MACHINING**



**Day after day, in all climates,  
you can count on  
Exide cranking power**

Exide Diesel Batteries are built specifically for heavy duty cranking jobs. They're a product of close cooperation of engine and starter builders and Exide research-engineering. Test after test, under the most exacting conditions, assures dependable starting in all types of Diesel-powered equipment. Exide Diesel Cranking Batteries give you:

**HIGH MAINTAINED VOLTAGE** for a quick breakaway and high cranking speeds.

**EXTRA LONG LIFE**—low depreciation, less frequent replacements.

**LOW COSTS**—operation, maintenance, repair.

**RUGGED CONSTRUCTION** for rough usage and hard service.

To assure your customers dependable cranking, equip your trucks, buses, tractors or aircraft—gas or Diesel-powered—with economical, long-lasting Exide Batteries.

When it's an Exide  
your Diesels **START**



THE ELECTRIC STORAGE BATTERY COMPANY  
Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

"Exide" Reg. Trade-mark U. S. Pat. Off.

1888

DEPENDABLE BATTERIES FOR 63 YEARS  
1951



**Bulldog Toughness  
Greyhound Speed...**

*that's  
Mack's  
LF  
Chassis*



### **...Bearings Engineered by SKF**

Mack's been building trucks for many years . . . but they've never built a better one than the LF Chassis for heavy trucking service. It's tough . . . able to handle the heaviest jobs. And it's fast . . . able to turn in extra hours of work in minimum work hours, thanks to either five-speed or Mono-Shift ten-speed Duplex transmission.

Once again, a progressive automotive manufacturer has chosen SKF. Mack knows from experience that SKF Bearings can always be depended on to turn in a completely dependable performance. That's because of SKF's rigid standards of manufacture, strict inspection of every bearing, continuous program of research and development. SKF can always be depended on to help industry put the right bearing in the right place.\* 7208



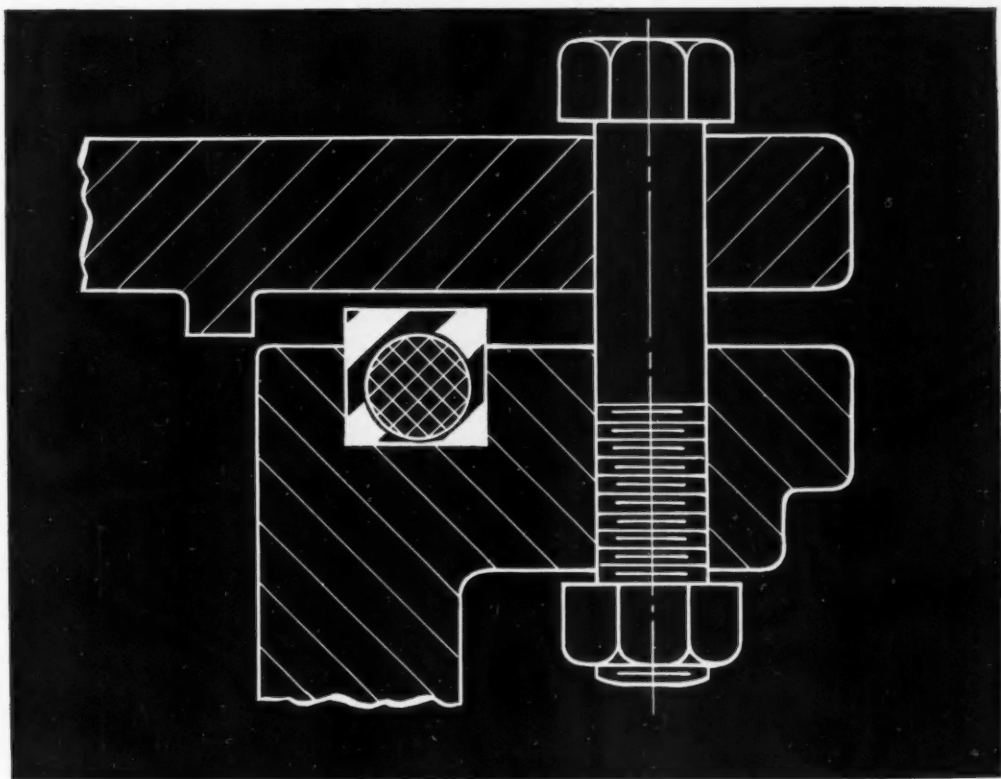
integrity  
craftsmanship  
metallurgy  
tolerance control  
surface finish  
product uniformity  
engineering service  
field service

\* For complete information on Mack Model LF Chassis, for the widest possible range of heavy trucking services, write Mack Manufacturing Company, Empire State Bldg., New York 1, N. Y.

# **SKF**

**SKF INDUSTRIES, INC., PHILA.**  
32, PA.—manufacturers of  
SKF and HESS-BRIGHT bearings





## How practical gasket tolerances help cut sealing costs

Close tolerances in resilient gaskets and the extra expense they involve seldom are necessary. Even metal-to-metal joints can be sealed without resorting to molded gaskets, mirror finishes, or mechanical provisions to relieve side flow.

The drawing above, for example, shows a typical metal-to-metal joint. In the channel an "O" ring section is superimposed on a section of the rectangular gasket that replaces it, a lathe-cut ring of Armstrong's Cork-and-Rubber. As you will observe, a cork-and-rubber ring is cut to full channel width. Its wall may be 1.25 to 1.50 times channel depth, depending upon the compound. Perfect mating of the metal parts is nevertheless possible because, unlike straight rubber, cork-and-rubber decreases in volume when compressed. It is obvious that with a material of this type, gasket tolerances are not critical.

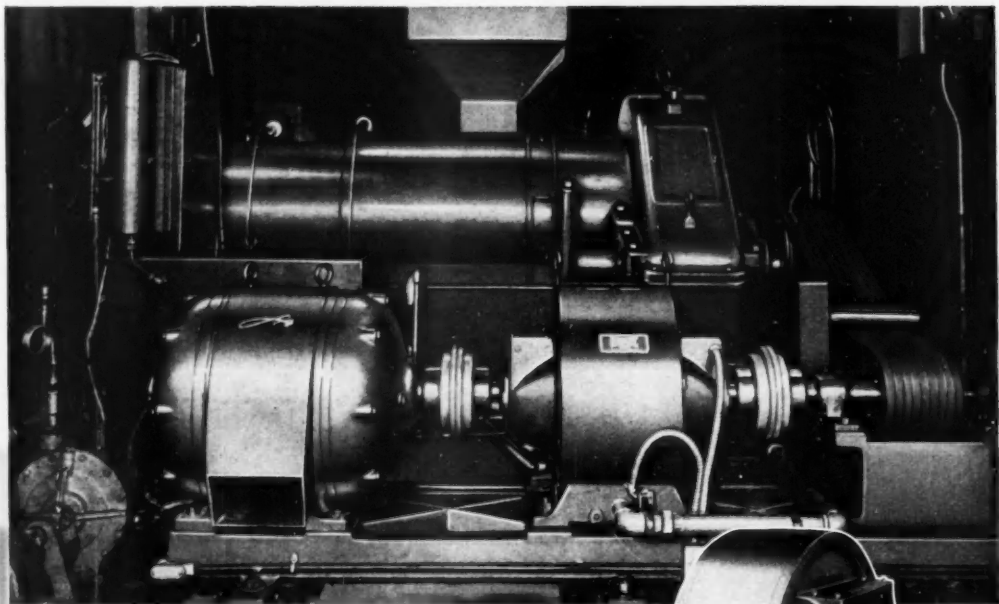
The wider tolerances permissible with compressible gaskets may affect savings in machining time. Cork-and-rubber of a suitable durometer seals effectively against rough machined surfaces. With a compressible gasket, therefore, the only critical tolerance is the one imposed on the metal parts by assembly demands.

From a cost point of view, it is advisable when gasket quantities are large to design joints to accommodate rings that can be lathe-cut from tubes of cork-and-rubber stock. In general, the range of tube size is from about 1" to 20" O.D. Do not, however, rule out the use of these economical rings if joint sizes fall outside this range. Discuss your problem with your Armstrong representative. He may be able to suggest means of supplying your needs. In some cases, for example, cork-and-rubber ribbon may be formed into rings, square or rectangular in section.

Compressible gaskets made from Armstrong's Cork-and-Rubber Compositions make it possible to do many things that cannot be done so well or so economically with non-compressible materials. See Armstrong's Gasket Materials manual in Sweet's file for product designers for other design suggestions covering both joints and gaskets. For a personal copy of this manual, write to Armstrong Cork Co., Gaskets and Packings Dept., 1502 Arch St., Lancaster, Penna. Available for export sale.



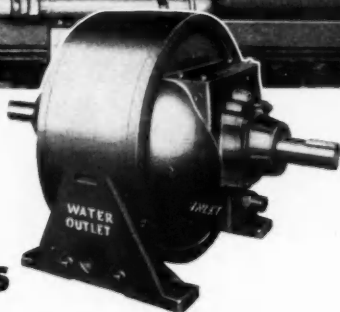
**ARMSTRONG'S Gasket Materials**



Model 6-W Dynamatic Water-Cooled Coupling, driving a No. 8 National wire jacketing extruder from a 100 HP, 1800 RPM cage motor in the plant of a large electrical manufacturing company.

**DYNAMATIC**  
®

**WATER-COOLED  
POWER COUPLINGS**



## Adjustable Speed Drive from AC Source

WIDE SPEED RANGE  
INSTANTANEOUS RESPONSE  
ACCURATE SPEED CONTROL  
STEPLESS SPEED ADJUSTMENT  
SMOOTH TORQUE TRANSMISSION  
TOTALLY ENCLOSED  
SIMPLE • QUIET  
COMPACT • EFFICIENT

Dynamatic Water-Cooled Couplings provide adjustable speed drive direct from an AC power source for a wide range of industrial applications. They transmit rotation from a driving to a driven member without mechanical contact, with stepless adjustable control and almost instantaneous response. A simple method of providing adjustable speed from a constant speed source (or vice-versa) with full torque starts.

Effective water-in-the-gap cooling permits large capacity in small space; design provides complete protection against atmospheric impurities.

Standard sizes are available for transmitting torques of 50 pounds feet to approximately 5,000 pounds feet. Units up to 200,000 pounds feet or larger can be built to order.

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**DYNAMATIC**  
®

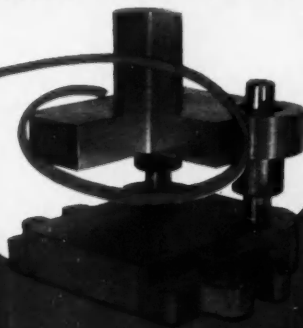
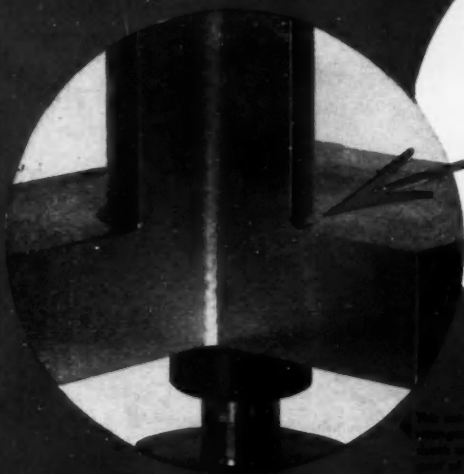
**CORPORATION • KENOSHA WISCONSIN**

Subsidiary of EATON MANUFACTURING COMPANY, Cleveland, Ohio

Dynamometers • Oil Well Draw-Works Brakes • Adjustable-Speed Couplings • Eddy-Current Brakes  
Ajusto-Speeds • Shovel Clutches • Press Drives • Lift Truck Clutches • Electronic Controls

This quality feature is **STANDARD** construction on all-steel shank type

## DANLY DIE SETS



This technology for new shanks has changed, and the shank is now welded to the punch holder. The shank is now part of the punch holder and is welded.

## DANLY INTEGRAL WELDED SHANK

A new welding technique that assures 100% fusion of shank to punch holder makes this superior construction possible. Knock out holes in the shank itself or machining on the punch holder face are much less likely to effect shank strength.

Features like this make Danly the nation's leading die set producer. Check these other Danly Die Set advantages and you'll see why die makers and production men everywhere prefer Danly Die Sets:

- *prompt delivery* . . . from the nearest of the nation wide system of Danly assembly branches.
- *precision construction* . . . leader pins and bushings hardened and ground to precision tolerances and lapped after assembly to provide a smooth running fit.
- *broad selection* . . . the wide range of Danly standard and stocked special die sets meets nearly every tooling need.
- *Danly reliability* . . . every Danly Die Set is backed by the experience accumulated in more than a quarter century of service to the stamping industry.

### DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois



PRECISION DIE SETS . . . STANDARD AND SPECIAL

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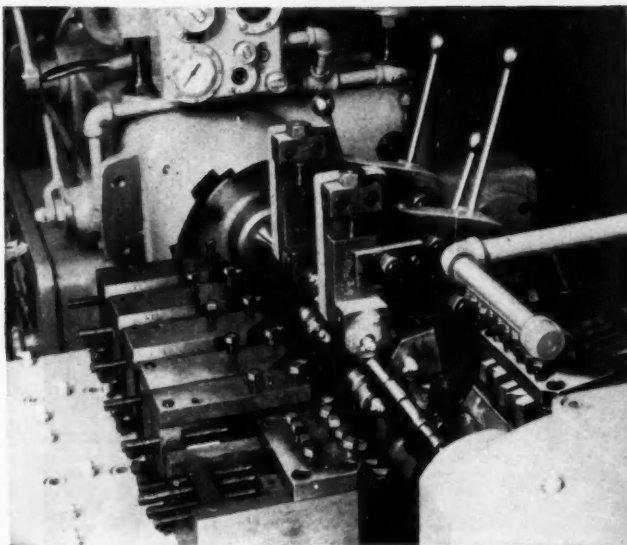
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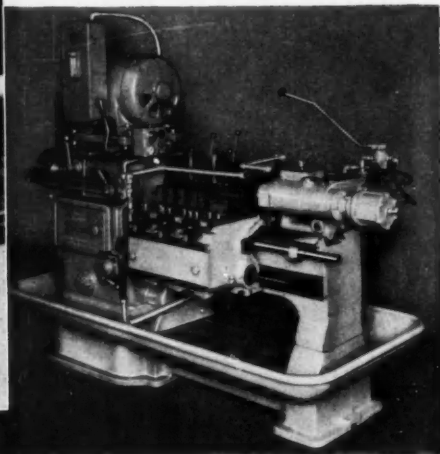
# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



Left: Closeup view of tooling and steady rests.

Below: Model LR Lo-swing Lathe equipped for machining spinning rolls.



## MODEL LR Lo-swing LATHE SPEEDS SPINNING ROLL PRODUCTION

**Problem:** To turn and face long spinning rolls within close tolerances.

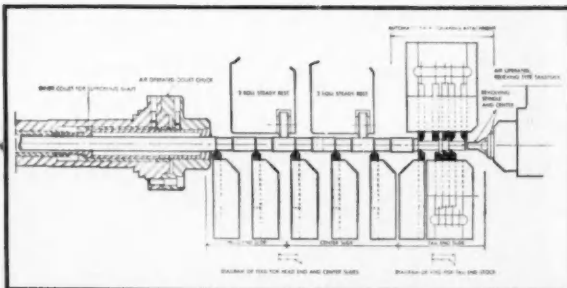
**Solution:** The Model LR Automatic Lo-swing Lathe selected for this job was equipped with a hollow spindle to permit one-half of the spinning roll to extend into the spindle. This method increased the rigidity of the work and assured closer machining tolerances. The upper right illustration shows the lathe equipped for the first turning operation. Note the relieving type tailstock which swings on hinged joints to facilitate loading work into the collet chuck. The upper left illustration is a closeup view of the tooling and steady rests.

The spinning rolls are turned from ground stock, properly centered on each end. They are supported by the collet chuck, two 3-roll rests, and a tailstock center, as shown in the tooling layout below. This method holds the work very rigidly and assures the close tolerances specified on the turned diameters.

The entire operation is automatic; the operator simply places the roll in position and locks the steady

rests on the previously ground bar stock. The machine cycle is then started and continues automatically until all diameters are turned and faced, and the tool slides returned to the starting position. A similar machine and tooling is used for machining the opposite end of the shaft.

Let Seneca Falls engineers assist you with your turning problems.



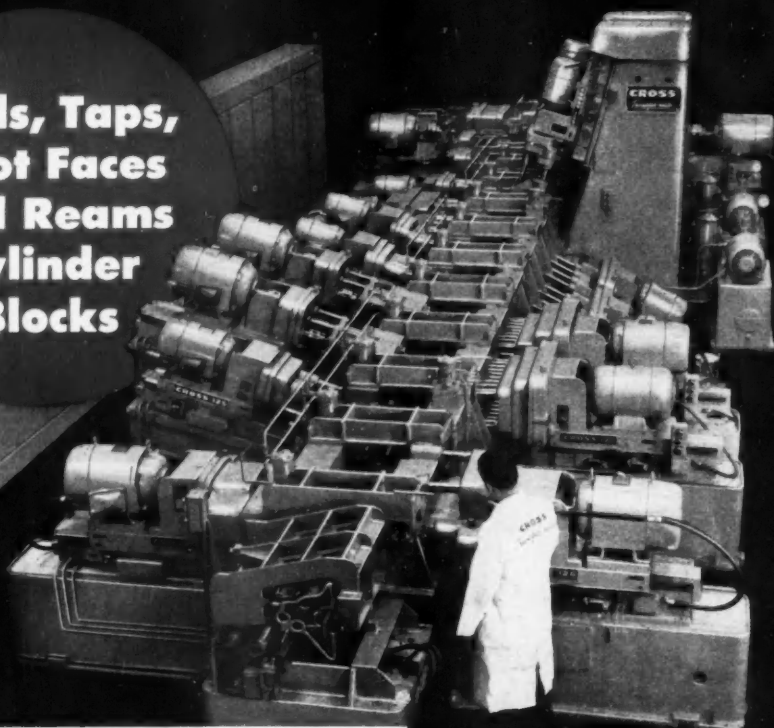
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

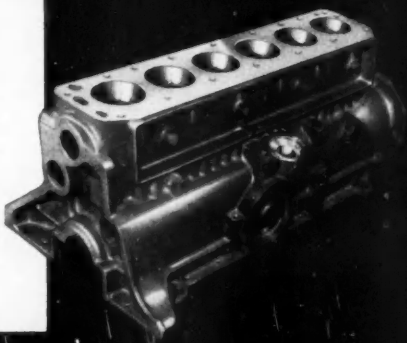


*Another Transfer-matic by Cross*

**Drills, Taps,  
Spot Faces  
and Reams  
Cylinder  
Blocks**



- ★ 100 cylinder blocks per hour at 100% efficiency.
- ★ 13 stations with automatic transferring.
- ★ Chamfers cylinder bores top and bottom; drills and reams distributor hole and dipstick hole; drills oil holes from main bearings to oil gallery; drills, chamfers and taps head stud holes and pan rail holes.
- ★ Cleaning unit at Station 11 vibrates and rotates part 360° to remove all chips prior to tapping.
- ★ Inspection unit at Station 12 stops machine if holes are not to proper depth.



Established 1898

THE **CROSS** CO.  
DETROIT 7, MICHIGAN  
*Special* MACHINE TOOLS



# The part that cost 34% less when made from TIMKEN® seamless tubing

**HERE ARE THE COST FIGURES:**

	BAR STOCK	TIMKEN TUBING
Cost of material per 1000 pieces . . . . .	\$68.16	\$49.25
Material savings with tubing—\$18.91		
Number of pieces produced per hour on six-spindle 2½" capacity automatic screw machine . . . . .	163	300
Machining cost per 1000 pieces (estimated machine operating cost per hour—\$6.50). . . .	\$39.88	\$21.67
Machining savings with tubing—\$18.21		
<b>TOTAL SAVINGS WITH TUBING—\$37.12, or 34.3%</b>		



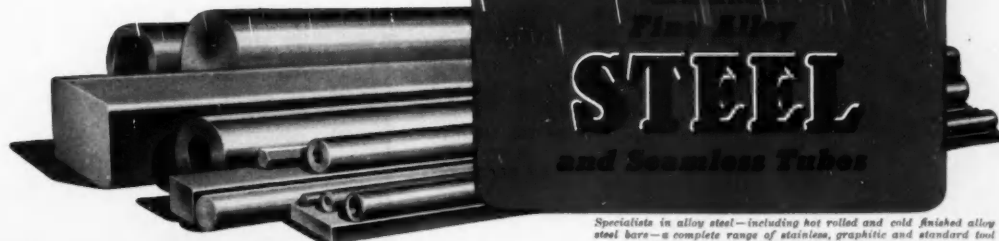
**I**F machined from bar stock, the part shown here would cost 10.8¢. But it is costing the manufacturer only 7.09¢—because it's made from Timken® seamless tubing. How was this 34% saving possible? The figures above tell the story.

Timken tubing eliminates drilling because the hole is already there. You usually can start right in with finish boring. There's less stock to machine—less scrap loss. And because of the uniformly fine forged quality

of Timken steel, you get a better finished product.

To get the most economical tube size for your job, guaranteed to clean up, use our Tube Engineering Service. With the tube we specify, there's no excessive stock, yet you're sure of enough metal to fill out your dimensions. It's *guaranteed*. Write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

**YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH**



Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphite and standard tool analyses—and alloy and stainless seamless steel tubing.

# Bendix Products

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

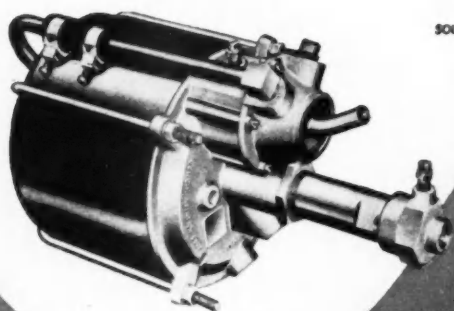
## HYDROVAC

**THE POWER BRAKE PREFERRED ABOVE ALL OTHERS!**

More than two million installations are certainly undeniable proof of any product's popularity. In the field of power braking it means that one—the Bendix Hydrovac—is preferred above all others. Such overwhelming acceptance by the men who service, drive and own the nation's trucks is impressive enough in itself. It further

suggests, however, that Hydrovac\* power braking might very profitably be included as original equipment by most manufacturers. If you are interested in taking advantage of this great pre-sold market, write the factory direct for details on Hydrovac—the undisputed leader in power braking.

\*REG. U.S. PAT. OFF.



**BENDIX PRODUCTS**  
DIVISION of  
SOUTH BEND 20, INDIANA



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**Continuum  
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and Parking Brake**



**9-27 Power Braking  
System for Cargo Trucks**



**Bendix Hydraulic  
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**BUILDERS  
OF THE BASICS  
OF BETTER  
MOTOR VEHICLES**



**Bendix Automatic  
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Power Gear Shifter**



**Bendix Brakes for  
Buses, Trucks, and  
Passenger Cars**

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## High Spots of This Issue

### ★ Impact of the Rearmament Program

At their annual meeting in January at Detroit, SAE engineers were told the Army expects to spend \$6½ billion for tanks, motor vehicles and guns. The article describes new developments brought to light at the meeting, and publishes extracts from some outstanding papers. Page 32.

### ★ Chrysler V-8 Engine, Power Steering and Torque Converter

The high compression engine presented in the 1951 Chrysler line develops 180 bhp at 4000 rpm with compression ratio of 7.5 to 1. It is for use in Chrysler New Yorker and Imperial models. Two separate and complete articles on Chrysler give all details on motor, steering, and torque converter, pages 38 and 42.

### ★ Axle for Short Wheelbase Truck Tractors

A rear axle designed by Timken-Detroit Axle Co. for short wheelbase highway tractor applications, provides top mounting of the final drive unit instead of the conventional front mounting. It retains all advantages of hypoid gearing in a two-speed double-reduction final drive. See page 41.

### ★ Studebaker V-8 Engine Plant—Part Two

Sampled in this study are operations on a number of engine elements as handled with utmost modernity on various transfer lines. Discussed are operations on main bearing caps, clutch housings, exhaust manifolds, crankshafts, connecting rods, and the engine block itself. Page 46.

### ★ New Power Steering Gear

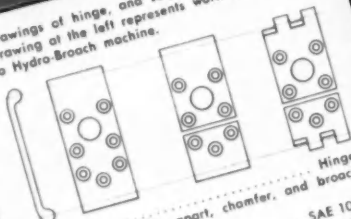
A power steering gear adopted as standard equipment on passenger cars makes its debut on 1951 Chrysler eight-passenger and limousine Imperials. Called Hydraguide and offered by Gemmer Mfg. Co., it gives instantaneous response to steering gear movement, even with the car standing still. Page 50.

### ★ 22 New Product Items And Other High Spots, Such As:

How the 41st Annual National Motor Boat Show outdid previous exhibits; the 1951 De Soto with larger, more powerful engine; what makes the Reo Eager Beaver waterproof; the Talbot engine; and a story on vibration control mountings in production.

*News of the Automotive Industries, Page 17  
For Complete Table of Contents, See Page 3*

Drawings of hinge, and sequence of operations. Drawing at the left represents work as delivered to Hydro-Broach machine.



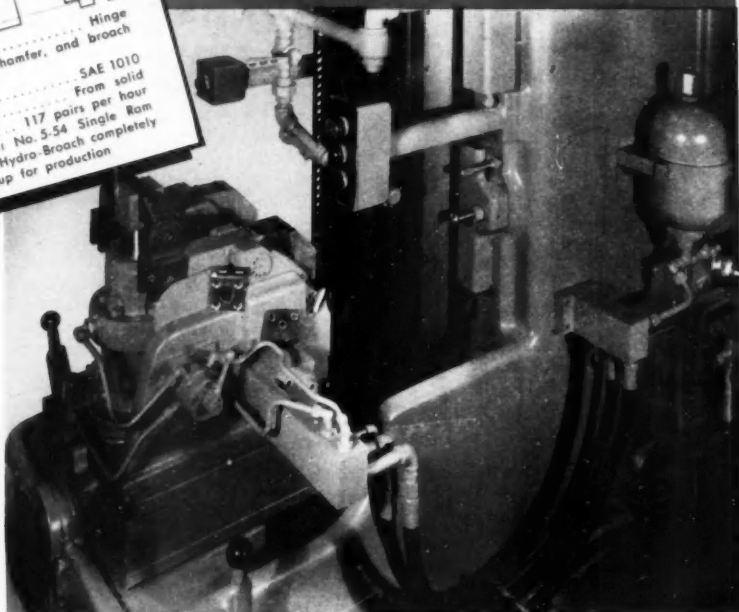
Part name..... SAE 1010  
 Operation..... Cut apart, chamfer, and broach notches..... From solid  
 Material.....  
 Stock removal.....  
 Production..... 117 pairs per hour  
 Machine..... CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach completely tooled up for production

# A pair of hinges

## CUT APART AND BROACHED EACH STROKE OF THE RAM



CINCINNATI No. 3-48 Single Ram Vertical Hydro-Broach Machine. Seven sizes are available up to 10-ton broaching force, 66" stroke. Write for catalog No. M-1389-2.



Progressive machining has its advantages. In this case, there are three: 1) standard machine; 2) one setup; 3) low cost. The machine is a CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach, tooled up by Cincinnati Application Engineers with a manually controlled hydraulically actuated fixture, to cut apart and broach hinges. In the left-hand station, the parts are cut apart and chamfered. Then they are transferred to stations 2 and 3, where the notches are broached in the pin end. By having three stations in a single fixture, and three rows of broach inserts (cutters) on the ram, one complete pair of hinges is produced each cycle. The operator is protected by Preset Cycle Control, a standard Hydro-Broach feature. The ram does not descend through its cutting stroke until the operator presses the Preset buttons with two hands. ¶This example is typical of Cincinnati Application Engineering in low-cost production. It's to your advantage to consider Hydro-Broach machines and Cincinnati engineers first when replacing equipment or re-tooling for a new product. May we hear from you?



THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

# CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES  
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 OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

# News of the AUTOMOTIVE INDUSTRIES

Vol. 104, No. 3

February 1, 1951



## OLDSMOBILE FOR 1951

The 1951 Oldsmobile series 98 Holiday sedan is distinguished by the stainless steel spear-like trim ornament on the rear fender. Mounted on a 122-in. wheelbase and powered by an improved Rocket engine with a compression ratio of 7.5 to 1, the 1951 series 98 Oldsmobiles have new leaf-type springs in the rear.

## Willys Doubles Sales in First Quarter

Willys-Overland Motors, Inc.'s dollar sales for all products in the quarter ended Dec. 31, 1950, were estimated at "more than double" the \$20,366,000 for the quarter ended Dec. 31, 1949, by Ward M. Canaday, Willys chairman and president.

## Studebaker Merges All Subsidiaries

In order to simplify its corporate structure, Studebaker has merged all its domestic subsidiaries with the parent firm. The Studebaker Export Corp. will now be known as the Export Div. and Studebaker Pacific Corp., which has conducted operations in the Los Angeles area, will be known as the Pacific Div.

## Wilson Sees Vehicles Cut 25% This Year

A definite prediction on vehicle production this year comes from C. E. Wilson, GM president. He said that automobile and truck production this year will be about two million less than in 1950, or a cut of about 25 per cent. Since output this quarter will

total about the same as for the same period in 1950, Mr. Wilson is apparently looking for heavier curtailments later this year. The only reason, of

course, that production is as good as in the same period a year ago is that Chrysler was out of production because of a strike for more than two-thirds of the first quarter of 1950. Actually, current production rates are 20 to 25 per cent under the prevailing levels of the last quarter of last year.

## K-F Asks Authority to Boost Salaries

Kaiser-Frazer is the first automobile company to ask permission to raise pay of its salaried employees since the imposition of the wage-price freeze. The company specifically asked for authority to increase salaries of employees not covered by union agreements, to increase the upper limit of pay for salaried employees earning \$8500 a year or more, and to establish an overtime pay policy for non-union salaried employees earning up to \$7800 a year. K-F production workers received pay increases in November and the company is apparently now attempting to adjust its salaried workers' pay upward by about the same percentage.



## CONVENTIONAL UNTIL FLIPPED

This 1951 version of the Kaiser Traveler utility sedan is one of four new Traveler models: special and deluxe two and four-door sedans. With the outward appearance of the Kaiser two and four-door sedans, the 1951 Travelers are conventional six-passenger sedans until the rear seat is flipped forward to provide 62½ cu ft of cargo space. With the rear panel open and the tailgate extended, the cargo capacity is increased to 105½ cu ft, and a floor area of 108 by 46 in. is provided.



# News of the AUTOMOTIVE

## Military Orders to Total \$4 Billion by June

The exact and complete total of war contracts in the automotive industries is not known, but an indication is the statement by Army Ordnance Corps that since July 1 more than \$3 billion worth of vehicles and spare parts has been ordered. The orders cover everything from medium tanks to nuts and bolts, with small suppliers accounting for nearly a third of the items. Also, hundreds of small companies hold subcontracts with large prime contractors. By the end of June, military orders to tank and automotive producers is expected to approximate \$4 billion, according to Archibald S. Alexander, Under Secretary of the Army. He added, however, that no Army contracts as yet have put any existing automotive assembly lines out of operation, but that there is no doubt that many companies will soon be cut back in civilian production because of the need for producing defense items and also because of scarcity of materials for civilian items.

## Chrysler Gets \$99 Million Tank Order

Chrysler Corp. has been given a supplementary \$99 million contract for heavy tanks, according to Brig. General D. J. Crawford, Commanding General, Ordnance Tank-Automotive Cen-

ter. The tanks will be produced at the new tank plant being built by Chrysler at Newark, Del. The order is in addition to the original medium tank contract awarded to Chrysler on Dec. 22, which called for about \$160 million worth of medium tanks. Chrysler lost no time in starting construction of its new plant at Newark, Del., for building medium tanks. Preliminary grading and filling operations were started early in January and steel has been ordered so that construction can begin as soon as foundations are finished. In addition Chrysler has received a \$100 million contract to produce tank engines under license from the Continental Motors Corp.

The Ordnance Tank-Automotive Center has also summarized the following other contracts for vehicles, combat units and parts which have already been awarded to date: Chrysler Corp., \$323.5 million for combat and tactical vehicles; GM's Chevrolet Div., \$6 million, for administrative vehicles; Reo Motors, Inc., \$65.2 million for tactical vehicles; International Harvester Co., \$582 million for combat and tactical vehicles; Diamond T Motor Co., \$52.5 million for tactical vehicles; Firestone Tire & Rubber Co., \$23.5 million for tires and tank tracks; GM's Truck & Coach Div., \$144 million for tactical vehicles; Goodyear Tire & Rubber Co., \$23.5 million for tires and tank tracks; American Locomotive Co., \$200 million for combat vehicles; Pacific Car &

Foundry Co., \$56 million for combat vehicles; Studebaker Corp., \$76.6 million for tactical vehicles; GM's Allison Div., \$26 million for transmissions; Food Machinery Co., \$177.5 million for combat vehicles; Timken-Detroit Axle Co., \$29 million for components; Allis-Chalmers Corp., \$188 million for tactical vehicles; Fruehauf Trailer Co., \$34 million for trailers; American Car & Foundry Co., \$100 million for combat vehicles; Continental Motors Corp., \$95 million for engines; Willys-Overland Motors, Inc., \$95.5 million for tactical vehicles; and Massey-Harris Co., \$55 million for combat vehicles.

The Dept. of Commerce has announced the following tire and tube contracts for the Dept. of Defense: Armstrong Rubber Co., \$3.6 million; Pacific Rubber Co., \$1.9 million; Mohawk Rubber Co., \$5.3 million; General Tire & Rubber Co., \$1.4 million; Dayton Rubber Co., \$1 million; Mansfield Tire & Rubber Co., \$3.7 million; Goodyear Tire & Rubber Co., \$6.2 million; Lee Tire & Rubber Co., \$1 million; U. S. Rubber Co., \$3.7 million; Firestone Tire & Rubber Co., \$1.2 million; and Dorman Tire & Rubber Co., \$1.7 million.

In addition the following other contract awards were announced: ambulances, \$1.9 million, Watson Auto Equip. Co.; reconditioning of aircraft, \$3 million, Lockheed Aircraft Service, Inc., and \$3 million, Pacific Air motive Corp.; airplanes, \$3.8 million, Douglas Aircraft Co., Inc.; trainers, \$2 million, Link Aviation, Inc.; helicopters, \$3 million, United Aircraft Corp.; aircraft deck turrets, \$4.9 million, the Glenn L. Martin Co.; six-cyl Diesel engines, \$3.5 million, Packard Motor Car Co.; and turbo-jet engine spare parts, \$5.1 million, GM's Allison Div.

## Cadillac Tank Contract Upged to \$463 Million

Revelation by Cadillac and the Detroit Ordnance Tank Automotive Center that the Cadillac Cleveland Tank plant has commitments totaling about \$463 million shows that war orders in the industry may be larger than have been announced thus far. The original contract was announced as \$110 million, but subsequent information reveals that it was actually for approximately \$300 million. Since the original contract was signed, further orders in the amounts of \$57 million and \$106 million have been added. The latest contract covers development and production of an entirely new combat vehicle. Eventual employment at the plant is expected to be about 16,000 persons on a three-shift operation. It is estimated that about 1000 suppliers will be involved in the tank project.

## 1950 NEW PASSENGER CAR REGISTRATIONS\*

Arranged by Makes in Descending Order According to the 1950 Eleven Months' Totals

MAKE	ELEVEN MONTHS				
	Units		Per Cent of Total		
	November 1950	October 1950	November 1949	1950	1949
Chrysler	103,552	128,778	90,677	1,312,386	957,359
Ford	72,106	113,218	68,272	1,083,167	718,722
Plymouth	52,365	67,961	47,466	484,979	479,150
Buick	34,706	41,690	27,605	481,509	344,960
Pontiac	29,834	36,150	27,171	402,254	293,768
Oldsmobile	26,914	29,418	23,159	335,680	246,982
Mercury	27,680	25,583	17,317	291,331	185,630
Dodge	22,029	31,340	27,509	266,847	250,163
Studebaker	9,030	18,065	17,094	248,108	182,394
Nash	10,394	14,605	11,781	187,716	125,522
Chrysler	12,288	16,997	11,515	133,170	119,748
Hudson	5,737	4,605	7,058	124,246	125,569
De Soto	10,516	12,397	9,487	100,396	95,119
Cadillac	10,293	11,288	8,376	94,389	74,374
Kaiser	4,993	9,496	2,788	80,075	54,679
Packard	5,850	7,390	6,931	65,576	91,071
Willys	1,655	2,560	1,992	31,844	26,684
Lincoln	2,351	2,700	2,938	30,970	35,004
Fraser	178	244	463	11,622	15,305
Henry J.	4,491	5,330	9,621	9,621	15,305
Crosley	391	573	615	6,395	9,630
British Austin	257	345	462	5,135	3,199
British Ford	190	214	93	3,177	4,978
Misc. Foreign	779	1,101	324	8,083	3,214
Misc. Domestic	409	359	10	1,996	1,523
<b>Total—All Makes</b>	<b>444,193</b>	<b>580,373</b>	<b>409,702</b>	<b>5,774,179</b>	<b>4,423,763</b>
				<b>100.00</b>	<b>100.00</b>

\* Based on data from R. L. Polk & Co.



# INDUSTRIES

## Air Force Confirms K-F \$200 Million Contract

The Air Force has officially confirmed that Kaiser-Frazer will build C-119 cargo planes at its Willow Run plant. Air Force officials said that the contract may eventually total \$200 million or more. There have been various reports that K-F would move its automobile assembly from Willow Run when plane manufacture is started, but the latest information from the company is that the production of cars will be carried on at the plant along with aircraft output. About one million sq ft of K-F's available space at Willow Run, or about 25 per cent, is being allotted for the aircraft job. Preliminary reorganization work has already started at the plant and initial manufacture is expected to get underway in April. First production of planes is scheduled for next fall.

## Army and Civilian Trucks Built on Same Line

Production of military trucks does not pose the problem for the automobile industry that other combat vehicles do. Two holders of military truck contracts, Dodge and Reo, have integrated army vehicles with civilian production and are running both types off the same assembly line. By careful planning and scheduling of assembly components, Dodge is building four different types of military vehicles along with regular commercial production in its truck plant. They include a cargo vehicle, a telephone and maintenance truck, utility truck, and field ambulance. All are four-wheel drive with  $\frac{3}{4}$ -ton nominal rating and are powered by a 94-hp, 230.2-cu in. displacement engine. Dodge military truck contracts now total more than \$92 million.

## Oldsmobile to Build Guns for Medium Tanks

GM's Oldsmobile Div. has received a second military contract. The latest order is for an undisclosed number of high velocity tank guns for the Army's medium tank program. Earlier, Oldsmobile received an order for 3.5-in. rockets. The guns will be built in a new building now under construction and originally intended for steel storage and engineering shops. Oldsmobile will produce the breech ring, breech block, and tube, with the other parts sub-contracted. More than 200 machine tools will be required including turning and boring lathes, and rifling, honing, milling, grinding, and broaching machines. Some heat treating operations



## NOW SHOWING IN MOSCOW

Called the ZIM, this new Russian automobile seating six persons is powered by a six-cyl engine developing 95 hp. and is said to have a speed of about 75 mph.

will also be required. During World War II Oldsmobile made 75-mm and 76-mm tank guns.

## Chrysler to Build Jet Engine for Navy

An initial outlay of more than \$50 million will be involved in the contract for jet engines which Chrysler Corp. will build for the Navy. Production will be centered in a new plant to be built by Chrysler in the Detroit area. There has been considerable speculation that the engine plant Chrysler is building at Trenton, Mich., will be turned over to the jet engine job, but this does not seem likely at present. Chrysler will build, under license from Pratt & Whitney, the J-48 turbo-Wasp jet engine which has a basic rating of 6250 lb of thrust which steps up to 8300 lb with afterburner. It is understood that use of water injection for short periods increases thrust considerably above that figure.

## North American to Make Sabres in Ohio

North American Aviation has announced that it will begin additional production of the F-86 Sabre at the U. S. Navy plant in Columbus, O. Several months of tooling and preliminary work will be required before deliveries can begin, according to J. L. Atwood, company president.

The company earned a net income of \$8,086,255, equal to \$2.35 per share, for the fiscal year ended Sept. 30. North American's profits for the fiscal year compared to a net income of \$7,306,409, or \$2.12 per share, for the previous fiscal year. The company also reported unfilled orders totaling \$311,844,812 as of Sept. 30, 1950. This backlog figure does not include a substantial amount of business now in the process of negotiation, according to the annual report by J. H. Kindelberger, chairman of the board.

## Pressed Steel Car Gets Tank Depot Contract

The Pressed Steel Car Company, Inc., has been awarded a \$10 million contract from the Ordnance Corps to establish a tank depot at its plant at Hegewisch, Ill. The contract calls for establishing and operating a plant to process all types of combat vehicle. It is the first depot to be operated by a contractor since World War II. Primary function of the depot will be to process vehicles built by other manufacturers to make them ready for issue to troops or for storage.

## GE Establishes Big Jet Center in Ohio

A big aircraft jet engine and turbo-prop test, development, and production center will be established at Lockland, O., to meet increased military needs for

# News of the AUTOMOTIVE

GE engines, by the General Electric Co. Stepped-up production will be achieved by more than tripling the space now occupied by GE in the large Lockland plant where Wright piston engines were made in World War II by purchase, lease, and new construction; establishing facilities for making jet engine components at Lockland; and greatly increasing the present jet engine assembly operation by increasing the capacity for the manufacture of components from subcontractors.

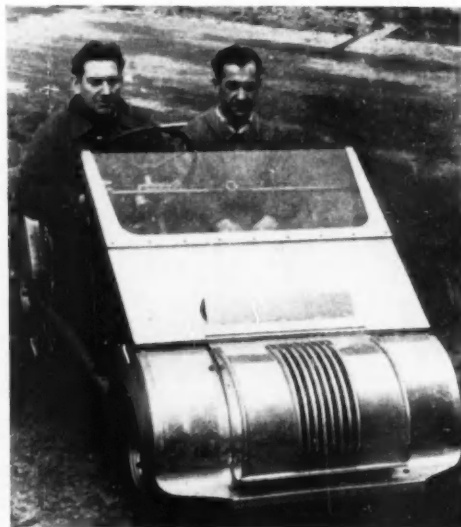
## Personal Plane Sales Up in 1950

Sales of personal aircraft in 1950 exceeded those of the preceding year, according to the Aircraft Industries Association. Based on official statistics for the first 11 months of 1950 and unofficial reports for December, the total number of personal aircraft sold in the year will exceed 3400 with a manufacturers' value exceeding \$18.5 million. This compares with 1949 sales of 3362 planes valued at \$14,324,000. The sharp increase in 1950 dollar volume reflects the demand for larger, more costly types used almost exclusively for executive travel.

## Hayes Mfg. Acquires Interest in 2 Firms

The Hayes Manufacturing Corp. has bought substantial interests in two companies engaged in the farm imple-

ment and aircraft engineering business. Hayes has acquired the personal holdings of Allen P. Kirby, New York industrialist, in the Skyline Corp., Wichita, Kansas, manufacturers of farm implements. The company also has purchased Kirby's interest, estimated at 60 per cent, in Aircraft Armament Inc., an engineering firm specializing in aircraft and related equipment.



Comaine Photo

## MADE FOR TWO

This new French Voisin bi-scooter is powered by a six-cyl engine, has four-wheel drive, and is said to have a gasoline economy of 90 mpg.



## BEING READIED

This is the first photograph of the Convair-Turboliner as it is being readied for flight. Two 2750-hp Allison 501 turboprop engines with four-bladed Aeroproducts propellers are installed. Consolidated Vultee will test the experimental plane in San Diego, Calif., before delivering the Turboliner to GM's Allison Div. for a flight research program.

## Ford Defers Building New Office Center

Ford has postponed indefinitely its plans for construction of a new 11-story administrative center in a Detroit suburb. The decision was made because of the critical situation requiring the use of materials for the defense program.

## Black and Decker Buys Land for New Maryland Plant

The Black & Decker Mfg. Co., Towson, Md., has purchased approximately 180 acres at Hampstead, Md., to build a branch plant to provide additional facilities for the manufacture of portable electric tools.

## Taylor Dynamometer Moves In Wisconsin

The Taylor Dynamometer & Machine Co. has moved into new quarters in Milwaukee, Wisc. The move was made to accommodate increased demands for production of "HI-EFF" equipment, and with its newly increased facilities, the company expects to be able to double its former output.

## Copper Order to Cut Chrome Plated Trim

Because of the amended copper order which bans the use of copper for plating in many decorative automotive items, manufacturers are working intensively on ways of substituting for

# INDUSTRIES

the banned items. Most common practice, at least at first, will be to substitute stainless steel for parts which are chrome plated over a copper base. However, nickel used in production of stainless steel is extremely short and extensive substitution probably will not be possible. The nickel shortage also affects producers who do not plate over copper because much more nickel is required when copper is not used as a base. If substitution with stainless steel causes too much of a problem, the next step will be either painted mouldings and other trim or leaving it off

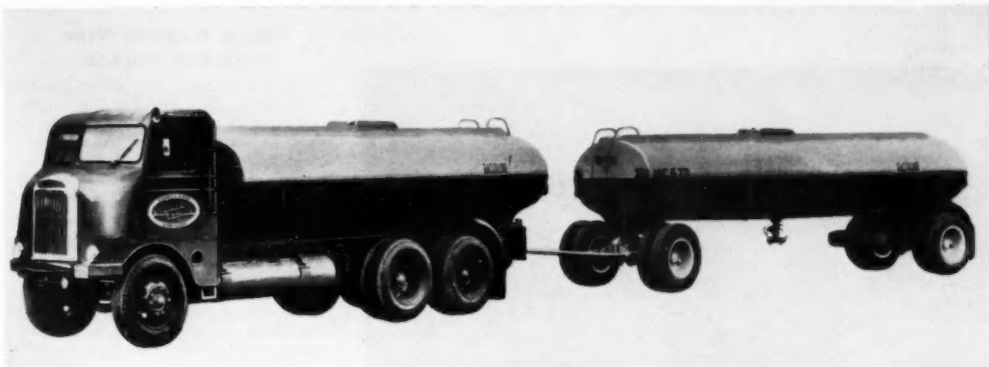
## Goodrich Reactivates Large Rubber Plant

The B. F. Goodrich Chemical Co. has completed reactivation of the first unit at its Institute, W. Va., plant and production is underway. The plant, the country's largest single facility for production of synthetic rubber, has a rated capacity of 90,000 long tons a year. Full production will be achieved by early April. Goodrich also operates a 60,000 ton synthetic rubber unit at Port Neches, Tex., which is producing in excess of its rated capacity.

ciala that unless help is given, farm machinery output as a whole would be down 25 per cent under last year's rate by June. A proposal for basic quotas of production and allocations of materials to the industry has been discarded for the present.

## Steel Industry Production to Expand 15 Per Cent

Completion of the steel industry expansion program by the end of 1952 will increase this country's steel production capacity to between 111 million



## DESIGNED TO CONFORM

The Freightliner Corp., Portland, Ore., has announced this new cab-over-engine petroleum transport, designed to conform to the recommended uniform standards of the American Association of State Highway Officials, stating that this is the first time that the COE design has been applied to bulk petroleum highway

transports. The COE truck chassis with a Buda six-DAS-844 250-hp Diesel engine weighs 14,000 lb, and with a 3650-gal tank, weighs 16,800 lb ready for the road. The truck and trailer combination has a capacity of 8050 gal with a combination dry weight of 25,320 lb. The wheelbase is 188½-in.

altogether. The copper order does not classify bumpers and grilles under non-essential uses for automobiles so at least for the time being they will be retained as bright work. However, the order bans such items as internal and external hardware, wheel disks and wheel rings, gas tank caps, headlamps and lighting accessories, mirrors, and brackets. The use of copper in functional items is not banned beyond the limitation of the original order.

Another serious difficulty with automobile exterior trim is experienced by manufacturers making extensive use of zinc die castings. The zinc shortage is so critical that item after item originally a zinc die casting has been replaced by steel stampings with chrome plating but which in the future may be merely painted. In certain items, such as the gravel shield, it is expected that metal will be dispensed with altogether and rubber substituted.

## Ford Expanding Coke Output at Rouge

Ford is expanding its coke producing facilities by adding 37 additional ovens at its Rouge plant. The additional ovens which will be completed late this year will increase coke capacity by about 215,000 tons annually.

## NPA to Set Up Section for Farm Equipment Makers

The National Production Authority is planning to set up a section for the specific purpose of working with industry and the Agriculture Dept. in assuring a flow of steel, copper and other materials to agricultural equipment manufacturers. Help will be on an individual company basis. This decision was made after the Farm Equipment Advisory committee had told offi-

and 115 million tons annually. The increase since the beginning of the Korean War will be about 15 million tons. Steel production this year is expected to approximate 100 million tons, or 3.1 million tons above the 1950 record. On the other hand, Russia's steel production for last year has been estimated at 28.6 million tons. Preliminary official figures on U. S. steel production last year showed that the industry turned out slightly more than 96.6 million tons of ingots and steel for castings, 24 per cent more than in 1949 and seven million tons above the previous record year of 1941.

## Bendix Buys Ford Plant in Hamilton, O.

The Bendix Aviation Corp. has purchased the old Ford Motor Co. plant at Hamilton, O., for the production of

# News of the AUTOMOTIVE

aircraft parts and accessories for the military services. The plant has been idle since Ford moved its Hamilton operations to Monroe, Mich. The plant will be operated as a new Bendix division with production scheduled to start as soon as equipment can be installed.

## Automatic Transmission Production Reduced

Material shortages have already resulted in a reduction in the number of automatic transmissions available to GM divisions. GM's Detroit Transmission Div. is reported to have reduced

the world's automobile movement, in 1900. He was engaged in daily newspaper work for a few years, and in 1904 became Paris correspondent of *The Automobile* (New York). In 1906 he joined the editorial staff of *The Automobile* in New York, but two years later returned to Paris to resume Continental representation. He became automobile and aviation correspondent for the *New York Herald*, covering all early flights in Europe.

In 1914 he was manager of a French race team which won first, second and third places at Indianapolis. At the outbreak of World War I, he volunteered in the British army and saw

Eyston in successful attempts on world's speed records on the Utah Salt Flats, and wrote a book *Speed on Salt* dealing with record attempts on the Bonneville Salt Flats.

In 1940 he was arrested by the Germans and put in a State prison, and was later transferred to a concentration camp. Released two years later broken down in health, he recovered quickly and joined the Resistance movement and was in Paris when the first American troops came through. He resumed work for AUTOMOTIVE INDUSTRIES at the end of 1944 and located in London.

## Harry Ferguson Plans New Research Lab

Harry Ferguson, Inc., will soon start construction of a \$500,000 engineering and research laboratory adjacent to its plant in Detroit. The building will have 50,000 sq ft of floor space. Production at the Ferguson plant is currently at the rate of 175 tractors a day.

## Mat's Handling Conference to Consider Automotive Problems

Materials handling problems in the automotive industries will be considered at the Materials Handling Conference to be held concurrently with the National Materials Handling Exposition in Chicago, April 30-May 4. The conference is sponsored by the American Material Handling Society.

## Tire Outlook Good for This Year

The passenger car tire outlook for this year is good, according to the tire industry. Production during the first two months of this year is expected to be as good as in November and December despite a reduction in the use of natural rubber ordered by the government. Certainly the country is much better off than it was in 1941 when total production of synthetic rubber was about 9000 tons a year. When current expansion programs are completed, annual output will be at the rate of 960,000 tons. With more and more natural rubber being conserved for truck tire use, the percentage of synthetic in passenger car tires is starting to climb, but tires are still of excellent quality and entirely safe. Great advances have been made in the quality of synthetic, and if it should be necessary again to go to a 100 per cent synthetic passenger car tire the product will be of satisfactory quality for general use.



## PLENTY OF PUNCH

This first flight photograph of Republic's F-84F Thunderjet shows it carrying 24 five-in. high-velocity aircraft rockets. Although no additional data can be revealed, it is said that this model's performance far exceeds that of the F-84E which has a top speed of well over 600 mph. The F-84F has a wing span of 34 ft, overall length of 38 ft, and it is 14 ft high (at top of rudder fin). Its maximum design gross weight of take-off is approximately 25,000 lb.

production because of the materials shortage. One GM division reports that the number of automatic transmissions available to its customers has been reduced by about 10 per cent.

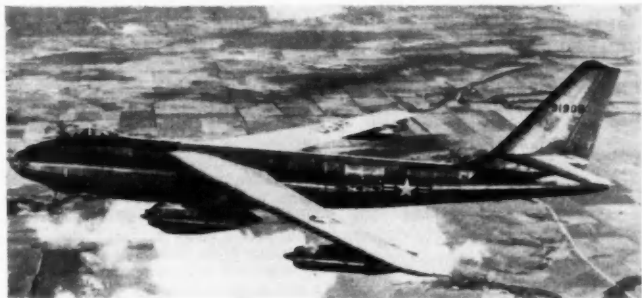
## W. F. Bradley Returns to Paris

W. F. Bradley, AUTOMOTIVE INDUSTRIES' European Correspondent, has returned to Paris, and has established his headquarters there. Educated at Leeds, England, Mr. Bradley was first attracted to Paris, then the center of

service in France and Italy, and was released to become war correspondent specializing in transportation. In 1917, at the request of the late Colonel Bolling, he joined the Bolling Mission in Paris, and was responsible for getting together the first automobiles used in France by the U. S. Air Force, and later, until the Armistice, worked on the design and production of special vehicles for the Air Force.

In 1919 he resumed work for AUTOMOTIVE INDUSTRIES and jointly for the Iliffe Co., of London, publishers of technical and business magazines. In 1935 he was manager for G. E. T.

# INDUSTRIES



## NOW IN QUANTITY

This is one of the first official photographs of the USAF Boeing B-47 Stratojet, now being built in quantity, which with a speed of over 600 mph is described as the fastest bomber in the world. It is powered by six turbo-jet engines, can carry over 10 tons of bombs, and has a gross weight of over 185,000 lb.

## Automobile Cost-Price Formula Considered

Pricing of automobiles by formula is expected soon. Officials of ESA and automobile company representatives have been discussing the price freeze on automobiles which rolled prices back to Dec. 1 levels. Previously, both GM and Ford had proposed that automobile prices be geared to manufacturing costs under a formula which would allow the manufacturers to recover at least part of their cost increases. Details are being worked out, but it is understood that a formula would be likely to permit price increases to offset increased costs since the start of the Korean War.

## Lockheed to Open Bomber Plant in Georgia

Lockheed Aircraft Corp. has been requested by the USAF to reopen the former Bell Aircraft bomber plant at Marietta, Ga. The initial task of the Georgia plant will consist of a combat modification program on B-29 Super Fortresses, with an ultimate program of complete manufacture of a current type plane. Over 28,000 persons were employed at the plant during the peak of World War II and a total of 668 B-29's were produced at the installation during the last war. James V. Carmichael, president, Scripto, Inc., who managed the plant during the war years, will again be manager.

## Goodrich Head Predicts Rubber Price Decline

Crude rubber prices should decline sharply some time this year, barring

much worse conditions in the Far East or a global war, according to John L. Collyer, president, B. F. Goodrich Co. He said that the supply of new rubber in 1951 should be the greatest in history by far, about 2.8 million long tons. Of this total, 1,860,000 tons would be crude rubber and 940,000 tons would be man-made, of which 880,000 tons would be produced in this country. He said that at least 550,000 tons of crude rubber should be available for additions to industry and government stocks, barring all-out war or a substantial reduction in crude rubber shipments.

## Ford Gets Dynamometers from Westinghouse

For the Ford Motor Co.'s Research & Development Center in Dearborn, Mich., the Westinghouse Electric Corp.'s Motor & Control Div. in Buffalo is building 17 dynamometers, all complete with electronic controls and motor-generator sets. It is the largest single dynamometer order Westinghouse has ever received. The manufacture of the equipment is already under way, and the first units will be shipped to Dearborn early in 1951. Eleven of the dynamometers will be 400-hp units each capable of turning at speeds up to 6000 rpm for engine testing. Another will be used to test transmissions and torque converters, and three others will be used for testing axles. Two 200-hp dynamometers and mechanical roll assemblies will test completed cars at speeds up to 100 mph.

## World War II Left Gap in "Middle Age" Cars

Because automobile production was halted entirely during World War II there are now no "middle age" cars five to seven years old in operation. In 1941, 25 per cent of all passenger cars were within that age range. Today 33 per cent of the passenger cars in operation are eight to 12 years old, compared with 20 per cent before World War II. Twenty-three per cent of the cars currently in use are 13 years old or older, compared with four per cent in 1941.

## 1950 NEW TRUCK REGISTRATIONS\*

Arranged by Makes in Descending Order According to the 1950 Eleven Months' Totals

MAKE	ELEVEN MONTHS			
	Units		Per Cent of Total	
	November 1950	October 1950	November 1949	October 1949
Chevrolet	31,030	36,873	27,487	336,781
Ford	23,908	28,154	20,857	281,772
International	3,933	6,804	6,832	91,934
Dodge	9,117	10,321	9,599	88,747
G. M. C.	7,808	8,735	6,020	86,131
Studebaker	2,818	3,763	4,044	42,676
Willis-Truck	1,222	1,495	1,041	14,110
White	997	1,241	585	10,656
Willis-Jeep	775	786	915	8,032
Mack	491	697	619	8,014
Diamond T	379	544	369	5,176
Divco	453	384	233	3,871
Roe	316	405	281	3,356
Brockway	289	246	151	2,134
Autocar	160	192	120	1,875
Federal	143	169	89	1,338
Pontiac	83	50	148	1,304
Kenworth	56	85	43	578
Grosley	28	30	44	391
Sterling	23	37	92	321
F. W. D.	34	30	25	299
Misc. Domestic	177	112	175	1,293
Misc. Foreign	25	26		338
Total—All Makes	84,167	101,169	79,699	1,053,121

\* Based on data from R. L. Peik & Co.



# News of the AUTOMOTIVE INDUSTRIES

## Car Radios and Heaters in Tight Supply

Shortages are beginning to appear in some accessory lines, particularly radios and heaters. Both these items contain sizable amounts of scarce copper so that the shortage may be a continuing one. One large company has recalled heaters from warehouses to the factory and is installing heaters only on cars going into areas where they are absolutely essential. Another field where shortages are apparent is in items for late model cars particularly 1951's because a large proportion of components was thrown into new car production, leaving a smaller reserve for service parts.

## Chrysler Workers Vote on Union Shop

Union shop elections are expected to be held among Chrysler hourly employees before April 1. Initial steps have already been taken to obtain the signature of 30 per cent of eligible employees requesting such an election under the Taft-Hartley law. Chrysler and the union agreed to the union shop clause in their latest contract, signed in December, provided the Taft-Hartley act was complied with.

## GM Role as Supplier Helpful on Materials

GM is in a favorable position to realize some advantage on materials because of its role as a supplier to many other companies. As shortages of materials curtail production among its automobile manufacturing customers, GM shipments of parts to them decline, releasing more materials for its own operations.

## Gasoline Rationing Not Expected Soon

Gasoline rationing is not foreseen in the future unless the supply from the Middle East oil fields is cut off, according to B. Brewster Jennings, president of Socony-Vacuum Oil Co., Inc. There are reports from Washington, however, that the quality of gasoline available for motorists may be reduced slightly in octane number to conserve more tetraethyl lead for aircraft fuels.

## Ford Enlarges Dallas Assembly Plant

Ford is planning to expand and modernize its assembly plant at Dallas, Tex. The size of the plant there will

be doubled through addition of 287,000 sq ft of space to bring capacity of the plant to 500 cars a day. L. D. Crusoe, vice president and general manager of the Ford Div., said that the expanded facility may possibly be producing defense products before or while it is used for civilian vehicles.

## GM Hikes Payment for Worker Suggestions

GM has made some major improvements in its employee suggestion plan. The principal change is an increase in the maximum award to a cash value of \$2500 payable in U. S. savings bonds. Previously, the highest award for an adopted suggestion was a \$1000 sav-

## Canada Increases Duty on Imported Cars

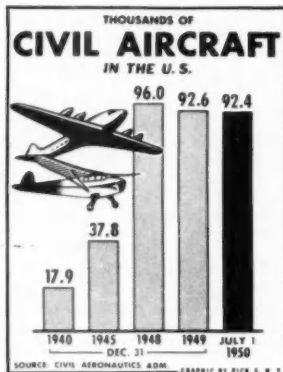
Canada will put anti-dumping duties into effect May 31 on automotive vehicles imported from other countries. The move is being made in order to protect the market for Canadian automobile companies. After the effective date, additional duties may be applied to automobiles imported into the country when government officials consider them priced below a "fair" level. Cars imported from England are expected to be particularly hard hit by the additional duties.

## Extend DO Ratings to Get Some Equipment Accessories

Under Amendment 3 to Regulation 2, the use of DO ratings may be extended to obtain certain accessories for production equipment. However, ratings may be extended only for accessories needed for actual production of defense equipment. This does not include machine tools or other complete units of production equipment. Specifically, ratings may be used for procurement of jigs, dies, tools and fixtures where inability to obtain these items would delay filling of defense orders. In the meantime, NPA is working out an assistance program for MOS (maintenance, repair and operations) needs.

## AMA Data Show Vehicles Essential to Economy

The Automobile Manufacturers Association is preparing extensive data to support evidence that automobiles and trucks should receive top essentiality rating under government controls and allocations. Comprehensive information showing the important status of motor vehicles in the national economy includes such factors as percentage of total freight moved by trucks, flexibility, dependence of 40 per cent of the nation's communities on trucks for essential goods, movement of population to suburbs, and studies showing high percentages of workers using automobile transportation to war plants are included in the presentation. Moves are already under way in Washington to allocate materials on the basis of essential need to various industries, and it is the prevailing opinion that motor vehicles will be classed as essential, although subject to some restrictions both as to production and to use.



ings bond. The minimum award has been increased from \$7.50 to \$10. Eligibility has also been broadened. Since the suggestion plan was adopted nine years ago approximately 145,000 suggestions have been adopted with awards totaling \$5,740,000. The average amount of each award has been \$40 and a total of 728 maximum \$1000 savings bonds awards have been paid out.

## Fisher Body Combinations Total Nearly 2500

Last year GM's Fisher Body Div. turned out 2480 different combinations of color, trim and body options in fabricating and assembling 97 different body styles offered by the corporation's passenger car divisions. Total production of bodies and body sets last year turned out by Fisher was 3,175,444, an all-time record. Of the total only 138,460 were exported to Canada and other countries. High production month was June with 322,810 units built.



# Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

The Budd Co.—**Albert Walton**, formerly plant manager of the company's Charlevoix plant in Detroit, has been named general manager of manufacturing.



Bell Aircraft Corp.—**Harvey Gaylord** has been elected vice-president in charge of all helicopter operations. **Leston Faneuf** was named secretary-treasurer.

General Motors Corp.—**Harlow H. Curtice**, executive vice-president, was elected a member of the Financial Policy Committee. **S. E. Skinner**, vice-president in charge of the accessory group of divisions, was elected a member of the board of directors and of the Operations Policy Committee. **Arnold Lenz**, recently appointed general manager of the Pontiac Motor Div., and **Jack F. Wolfram**, who succeeded Mr. Skinner as general manager of Oldsmobile, were elected vice-presidents of GM and members of the Administration Committee. **Clarence Stanley**, a member of the financial staff, was elected a GM vice-president. Buick-Oldsmobile-Pontiac Assembly Div.—**Edward D. Rollert**, assistant to J. E. Goodman, general manager of the BOP Div., was named manager of the new GM aircraft program in Kansas City. GMC Truck & Coach Div.—**Harold J. Havermale**, former general superintendent of inspection, is in charge of the military truck program. Rochester Products Div.—**Emanuel L. Sites** has been appointed comptroller of the division, succeeding **W. LeRoy Jordan** who is retiring.

Willys-Overland Motors, Inc.—**Kenneth M. Mueller**, formerly secretary and treasurer of the Black Advertising Co., Toledo, has been named assistant to the general sales manager of the company.

Wilson Foundry & Machine Co.—(a wholly-owned subsidiary of Willys-Overland Motors, Inc.)—**Ray E. Kalmback** has been named general manager.

Fairchild Engine and Airplane Corp., Fairchild Aircraft Div.—**Willard L. Landers** has been appointed general manager of the division. **Paul J. Frizzell** has been elected a vice president in charge of operations of the assistance agreement between Fairchild and the Kaiser-Frazer Corp.

J. I. Case Co.—**William L. Clark**, vice-president of the company, who has had general supervision of the domestic sales department, has been relieved of this responsibility at his own request and has been succeeded by **C. G. Pearce**, vice-president.

Ford Motor Co.—The General Mfg. Group, headed by vice president **John Dykstra**, has been redesignated as the Aircraft Engine, Tractor and Machined Products Group, with Mr. Dykstra continuing as head. **James K. Sutherland**, formerly manager of steel operations, Rouge div., was appointed general manager of the new steel division; **John C. Thrasher**, formerly assigned to the staff of the general manager, Rouge div., was named general manager of the new Dearborn general manufacturing div.; **Kenneth D. Cassidy**, formerly controller of automotive manufacturing operations, Rouge div., named general manager of the new manufacturing services division, and **Charles H. Patterson**, formerly production manager of automotive manufacturing operations, Rouge div., is general manager of the new engine and foundry div.

Sterling Bolt Co.—**Herbert Gordon** has been elected president, succeeding **Charles C. Gordon**, who has resigned.

Seiberling Rubber Co. — **Douglas Mueller**, director of public relations, has also been named assistant to president, **J. P. Seiberling**.

Allis-Chalmers Mfg. Co.—**Gordon F. Friauf** has been appointed general material supervisor.

Stewart-Warner Corp.—**John R. Howland** has been named to head a newly-created office of product research.

The Lincoln Electric Co.—**W. R. Persons** was elected vice president in charge-of-sales.

Pittsburgh Screw & Bolt Corp.—**John M. Yahres**, executive vice president, was elected president.

General Electric Co. — **Emil R. Schaeffer** has been appointed manager of manufacturing of the company's Switchgear Div. at Philadelphia. **Henry A. Vaughn** has been appointed manager of manufacturing of the company's Meter and Instrument Div. at Lynn, Mass. **Robert L. Gibson** has been named general manager of the company's Chemical Dept. with headquarters in Pittsfield, Mass. **John W. Belanger**, and **Nicholas M. DuChemin**, have been



Glenn L. Martin Co.—**Vernon Rawlings**, manufacturing divisional superintendent, has been named factory manager.

named general managers of the Large Apparatus Div. and Small Apparatus Div., respectively, of the company's Apparatus Dept.

Vickers Inc., Div. of The Sperry Corp.—**E. O. Clark** has been advanced to Industrial Products Sales Manager. **M. J. Taup**, formerly District Manager of Vickers, Inc., Chicago office, has recently been appointed Mobile Sales Manager.

Ford Motor Co., Lincoln-Mercury Div.—The appointment of **R. P. Powers** as manager of the forward product production engineering department has been announced.

P. R. Mallory & Co., Inc.—**Ray F. Sparrow** has been named senior vice president.

(Turn to page 102, please)

## Necrology

**Lee A. Ramsey**, executive vice-president, the Ramsey Corp., St. Louis, Mo., died in Los Angeles, Calif.

**Arthur Davidson**, 69, secretary and general sales manager, the Harley-Davidson Motor Co., Milwaukee, Wisc., died Dec. 30.

**Clarence W. Eaton**, 65, the mechanic on the pioneer Thomas Flyer, winner of the New York-Paris automobile race 43 years ago, died Jan. 8 in Buffalo, N. Y.

**Andrew J. Eldred**, 57, former advertising manager, Hudson Motor Car Co., and president of Automobile Corp., Lugington, Mich., died in Lugington on Jan. 7.

**Charles Brull**, former chief of the André Citroën laboratory; technical consultant to Georges Irat Co.; vice-president of the Turbo-Meca Co.; engineer of the Ecole Centrale of Paris; and vice-president of the French Society of Automotive Engineers, died in Paris, France, on Dec. 26.

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**GRADES**—Carbon, Alloy, and Stainless Steels.

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**CONDITION**—Unannealed, annealed, tempered, normalized, or otherwise heat-treated as required.

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Because of his factory-training in cost-saving tube-techniques... because he sells nothing but tubes... he may help you improve your operations in the production and application of mechanical tubing.

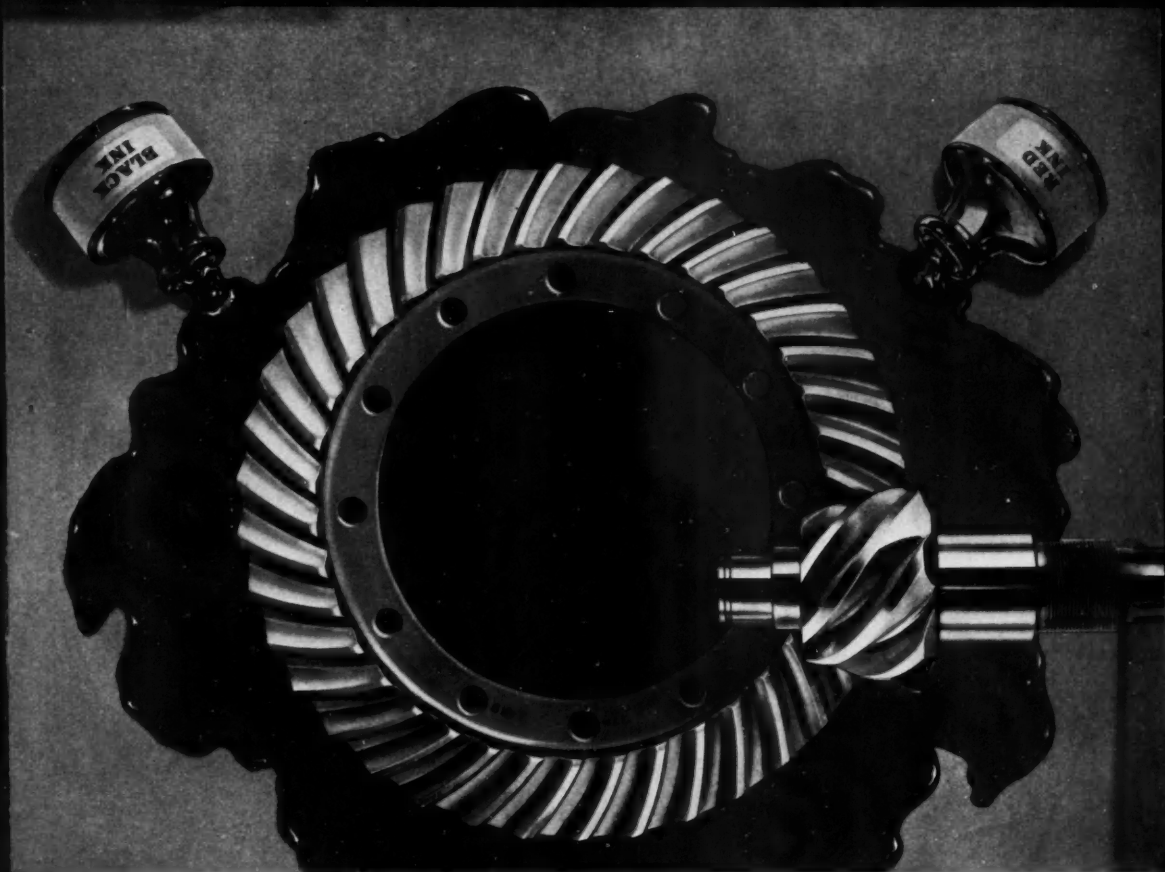


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TA-107-B



## Where Does the Red Begin?

WHERE GEARS are concerned, that's a question you may want to ask yourself. Too often the red ink begins too soon. It may begin with gears not dependably up to your specifications. You may find it in production slow-downs due to gear installation difficulties. You may find that poor performance is building up your service costs.

You may discover that gear-troubles are causing your customers to think of competitors' products.

If the red ink begins at *any* of these points you'll be well rewarded by discussing gear problems with "Double Diamond" engineers. "Double Diamonds" are produced to *work in the black*. They provide low installed cost. They

serve economically and dependably on the job for which you buy them. They do credit to your product and your reputation.

We have thirty-six years of such gear-building behind us. We believe we know gears, and we believe we know the true facts about gear costs. We'd like to discuss these matters with you at your convenience.



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RICHMOND, INDIANA

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FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS.....

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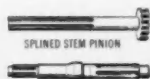
STRAIGHT BEVEL



STRAIGHT SPUR



HELICAL SPUR

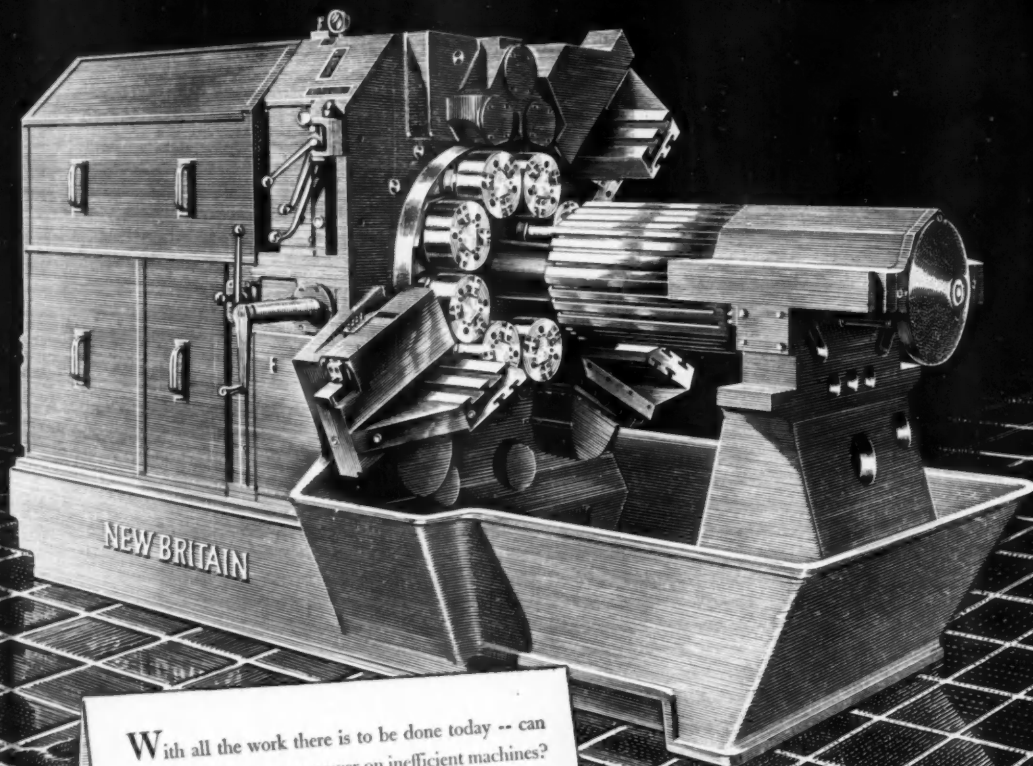


SPLINED STEM PINION

SPLINE SHAFT

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With all the work there is to be done today -- can you afford to waste manpower on inefficient machines? The New Britain-Gridley Division, The New Britain Machine Company, New Britain, Conn., U.S.A.

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Parco Lubrite

prevents metal-to-metal contact  
holds oil  
reduces subsequent wear

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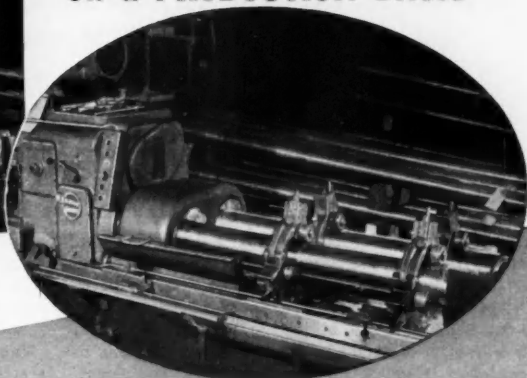
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# Impact of Rearmament

Army to Spend \$6½ Billion for Tanks, Motor Vehicles and Guns, SAE Engineers Told. New Developments and Large Number of Technical Papers Presented at Annual Meeting in Detroit.

OF the \$9.2 billion voted by the new Congress for the Army, \$6½ billion or 70 per cent is for tanks, motor vehicles, guns, spare parts and other "hardware," Under Secretary of the Army Archibald S. Alexander told the Society of Automotive Engineers at its annual meeting in January at Detroit.

This 70 per cent of procurement, he said, compares to 14 per cent, or \$660 million, that was set in the pre-Korean budget of \$4.88 billion for the fiscal year 1951, which ends next July 1. By then the Army plans to spend over \$4 billion for tank-automotive equipment. He pointed out that although the cost of a tank today is about double that of a World War II tank, the cost per unit horsepower is no greater for today's tanks, which was credited to the engineering brains and manufacturing skills of the automobile industry working with Army tank specialists.

Secretary Alexander stated that Government officials hope to have the accelerated military program in high gear by the end of the year and outlined steps that are being taken to minimize dislocations in large and small businesses, such extension of sub-contracting, financial assistance, channeling orders to avoid shut-downs, and scheduling for balanced production. A survey is in progress to determine from representative small businesses what the Army can do to hold them during the critical period between the drying up of raw materials for civilian goods and the taking on of Government contracts, which in the meantime may threaten the loss of skilled labor or create financial problems. Secretary Alexander emphasized that the impact on the automotive industries will be tremendous, but that no Army contract let to date will put out of production any existing auto-

mobile assembly line, but cutbacks will be necessary.

Dale Roeder, executive engineer, commercial vehicles, of the Ford Motor Co., was elected president of the society for 1951. He succeeded James E. Hale, president-elect, who died in November. L. Ray Buckendale, vice president of engineering, Timken-Detroit Axle Co., was named to fill Roeder's unexpired 1950-51 term on the SAE Council.

Of the 48 companies participating in the engineering display, several of them exhibited and demonstrated new developments. Auto Specialties Manufacturing Co. showed an improved Lambert Disc brake for passenger cars incorporating new anchoring of the wheel cylinders and a new locking-type adjusting screw. A new electric speedometer for buses was demonstrated by Stewart-Warner and also in operation was the self-cancelling directional signal switch developed by the Sparton Automotive Div. of Sparks-Withington.

Dualoc Drive, Inc., introduced its power-dividing

## Advanced Production Developments

By Joseph Geschelin

(The following extracts are from Mr. Geschelin's paper in which he summarized the four papers presented at the Production Forum)

**I**NCREASED Productivity in Production Machining, by Michael Field and Norman Zlatin, Metcut Research Associates—By far the major contribution of the authors is found in the emphasis on machinability as affected by the selection of the material and the proper development of its structure by metallurgical means. As the result of milling and turning tests on cast irons, it has been definitely established that microstructure rather than chemistry determines machinability. Annealing cast iron so as to convert the matrix into ferritic form has shown an increase in cutting speed from five to ten times that of conventional cast irons.

(Turn to page 76, please)

# Program

By James R. Custer

differentials for cars, trucks and tractors. They are automatic in distributing the torque between the wheels, giving the wheel with the greater traction the greater amount of torque. Buda announced a new series of Diesel six-cylinder engines for truck and off-the-highway vehicle applications. They feature monolobe combustion chamber and power increases of 20 and 24 per cent on the unsupercharged and supercharged models, respectively. Link Industries displayed its new device for production checking of engine valve springs.

During the five days, Jan. 8-12, numerous committee meetings were held and 45 papers were presented at the technical sessions. The Horning Memorial Medal was awarded to D. P. Barnard, research coordinator of the Standard Oil Co. (Ind.), and the Beecroft Award was presented to Sidney J. Williams, assistant to the president, National Safety Council. Symposia on liquified petroleum gas as an automotive fuel, advanced production developments, modern all-aluminum body developments and truck refrigeration were added features. Special extracts which have been prepared from some of the outstanding papers, begin on these pages.

## Stresses Imposed by Processing

By O. J. Horgar

The Timken Roller Bearing Co.

RESIDUAL stresses were measured on two different size truck rear axle shafts of 1 11/16 in. and 2 1/8 in. in diameter. These axles were taken from a test lot prepared by R. W. Roush of Timken Detroit Axle Co. and were of the full floating type known as Axaloy.

While different steels exhibiting shell hardening characteristics have been used for production shafts, those examined here were in accordance with 1046 analysis. They were machined and ground in the as-forged condition, austenitized at 1550 F for 20 minutes at temperature, then quenched in a 10 per cent caustic solution, straightened from the tempering temperature of 450 F and then shot peened. A high surface hardness of Rc 60 and low center hardness of Rc 25 to 28 were obtained from this treatment. The hardness survey



Dale Roeder, SAE 1951 president. Associated with the Ford Motor Co. since 1925, he is now commercial vehicle executive engineer, and during World War II was in charge of all military wheeled and track-laying vehicles produced by Ford for U. S. Army Ordnance.

and case microstructures indicated spotty surface decarburization on both drive shafts.

Two specimens were taken for residual stress investigation from each shaft, one toward the flange end and the other from the splined end. Metallurgical examination was made of the slice between these two samples. Internal stress findings were charted. After the final cutting operations on these cylinders the small shaft specimens closed-in both at the slit and tongues, indicating residual compressive stress in the surface. The large axle specimens opened-up both at the slit and tongues, exhibiting initial tensile stresses in the outer surface layer.

From results of completely reversed torsional fatigue tests made on 1 11/16 in. diameter shafts by Roush, it is of considerable practical importance to note the tremendous increase in fatigue strength of the shell hardened Axaloy shafts as compared with those approaching a through hardened condition. No residual stress studies were made on the alloy steel

shafts but it is reasonable to believe that a favorable internal stress pattern would not be present.

Here is a specific case whereby the usual criteria derived from an examination of microstructure and conventional tensile, impact, and fatigue properties of specimens cut from the shafts, the opinion would be ventured by most engineers that the alloy axles would exhibit at least as good or better fatigue life than the Axaloy shafts. Apparently the roll of a favorable residual stress pattern largely accounts for the actual improved fatigue strength of the Axaloy shafts.

## Operational Stresses in Automobile Parts

By Robert Schilling  
Research Laboratories Div.,  
General Motors

**I**N Table I are cited nominal stresses on the most important structural members of passenger car suspensions. Since it is a very large order to collect

## Impact of

such data for all models of the U. S. automobile industry, only a limited group could be surveyed. But this group extends over the full range of car sizes and is considered representative. The loading conditions for which stresses are calculated do not cover all the conditions which a designer must consider. All stresses are nominal stresses, without allowance for stress concentration.

Stress data shown in Table I check well with the service experience on these parts. That is the best reason we can have for using such calculations, although the loading conditions selected may appear arbitrary. Our aim in formulating a stress calculation must be first to predict service failure and only secondly to derive it in a rational manner. If we can

### TABLE 1—Stresses in Suspension Members

		(1) Static Load Stress	(2) Lateral Load Stress	(3) Rut Stress (1)+(2)	(4) Skid Stress 2x(1) - 2x(2)	(5) Overturn- ing Stress 2x(1) - 2.5x(2)	(6) Bump Stress 4x(1)	(7) Brinell Hardness	(8) Yield Strength psi
Front wheel spindle (Steering knuckle)	Average	10,000	46,000	+56,000 -36,000	72,000	95,000	40,000	240-290	100,000
	High	12,000	51,000	+61,000 -41,000	82,000	107,000	48,000		
Steering knuckle support	Upper	Average	19,500	+38,500 500	1,000	10,750	76,000	240-290	100,000
		High	20,500	+42,000 -2,000	4,000	15,000	81,000		
	Lower	Average	10,000	+31,000 -11,000	22,000	32,500	40,000		
		High	12,500	+37,000 -12,000	24,000	37,000	50,000		
King Pin	Average	22,000	52,000	+74,000 -30,000	60,000	86,000	88,000	Case 60 Rc	250,000
	High	26,000	58,000	+80,000 -34,000	69,000	98,000	104,000	Core 230 Br.	95,000
Rear axle shaft	Average	8,000	30,000	+38,000 -22,000	44,000	59,000	32,000	330-360	145,000
	High	11,000	45,000	+52,000 -38,000	75,000	98,000	44,000		
Rear axle housing	Average	9,000	2,500	+11,500 -6,500	13,000	11,750	36,000	Stamping	40,000
	High	12,500	3,500	+16,000 -9,000	14,500	12,000	40,000		
Lower wishbone front suspension	Stamping High	18,000					35,000	Stamping	40,000
	Forging High	21,000					47,000	207-255	80,000



## the Rearmament Program

do both, so much the better. In applying this information to new designs, we must never forget its source. Although the stress equations look like generally valid relations, they fit only a narrow range of service conditions, of sizes and shapes, and of manufacturing processes. Extrapolation beyond that range is possible, but it requires care and caution.

### Starters for Turbojet Engines

By William D. Downs  
Wright-Patterson Air Force Base

FIG. 1 shows a schematic drawing of a cartridge starter. Except for the cartridge unit and intake pipe, the air turbine starter is the same in design. In the air starter system, air is compressed by a gas turbine very similar to a turbojet engine. The reduction gear reduces the speed to a suitable cranking speed for the engine. A speed sensing device indicated as a governor in the sketch will cause the air to the starter to be shut off when maximum cranking speed has been reached. The mechanism indicated as a clutch is an automatic engaging and disengaging mechanism. This mechanism is required because the starter turbine is designed to reach its peak allowable speed when the turbojet is at probably 20 to 35 per cent of its operating speed.

Both from the point of view of weight and volume, the cartridge starter will be preferred over the completely self contained air starter for single engine and twin engine aircraft. However, if the gas turbine compressor unit is installed in a detachable blister or pod, the compressor unit may then be carried making the aircraft self-sufficient while moving from one air field to another; or, on the other hand, the compressor unit and its blister could be detached for combat missions. Then only the 28 lb starter and the weight of some tubing could be charged to an air starter. So that the air starter system may find use in some single and twin engine jet propelled aircraft. Likewise the cartridge starter may find application on multiengine aircraft in an installation such that one or two engines are started by the cartridge starter. The remaining engines would be equipped with air starters which would be energized by air bled from the first engine started.

Military considerations and design considerations are expected to determine the type of starter system which will be used. Turbojet engines delivering more than 9000 lb of thrust will require starting power in excess of 100 hp for a 20 second start and in excess of

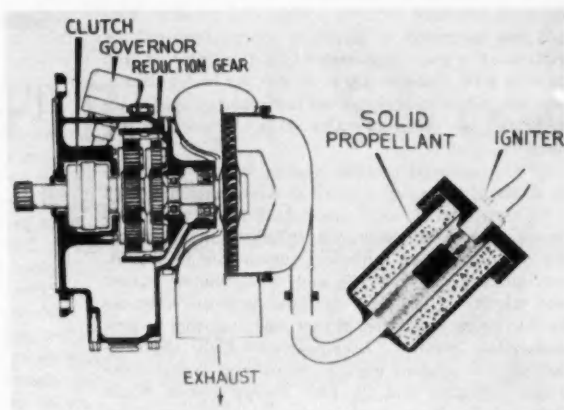


Fig. 1—Cartridge starter for turbojet engines.

1000 hp for a three second start. The need for a self contained starter system coupled with these high power requirements has led to the development of air starters and cartridge starters.

### High Energy Multiple Spark Ignition Systems for Jets

By M. A. Zipkin, H. E. Sheets and C. N. Scott  
Goodyear Aircraft Corp.

UNDER static conditions ignition energy requirements increase rapidly with increasing pressure altitude above 30,000 ft. In a static test chamber for example, the energy required to produce ignition at 75,000 ft pressure altitude is in the order of 75 times the energy necessary to effect ignition at 35,000 ft. It was also found that there is an optimum spark energy and that increasing the energy above this optimum results in decreased performance.

Similar tests in a flow tube simulating a burner inlet velocity of 100 fps indicated that the trend of increasing energy with pressure altitude found under static conditions is repeated under dynamic conditions. It was also shown that under dynamic conditions the minimum spark energy requirements are further increased above that required for static operation at a given pressure altitude. The spark energy required to initiate combustion at a simulated pressure altitude of 40,000 ft and a burner inlet velocity of 100 feet per second was 3.55 times as great as the energy required to effect ignition under static conditions at

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## Impact of the Rearmament Program

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the same pressure altitude. When the pressure altitude was increased to 55,000 ft energy required for ignition at a simulated burner inlet velocity of 100 fps was 2.16 times as great as for static conditions. Over the range of pressure altitudes and velocities investigated no optimum value of spark energy was found to exist.

An experimental ignition system was developed on the basis of the spark energy requirements indicated in the static and dynamic investigations. Tests of this system in a two-in. flow tube indicated that the system was capable of initiating combustion to a pressure altitude of 55,000 ft and to simulated burner inlet velocity of 160 fps. At lower pressure altitudes the maximum simulated burner inlet velocity is proportionately greater. A comparison of the performance of this system with a commercial transformer system indicated that the high energy system would effect ignition to a much higher altitude, simulated burner inlet velocity, and over a wider range of fuel ratios.

The final ignition system developed consisted essentially of an energy storage capacitor for each spark plug, and a fast acting, low loss switch which prevents the capacitors from discharging through the spark plugs until a predetermined amount of energy has been stored in the system. The capacitors are charged from a half-wave rectified source of high voltage. The entire discharge across the spark gap is completed in an interval of the order of one microsecond, and the effect of stray energy losses in the spark itself is therefore minimized. This rapid discharge of energy across the igniter gaps will, because of the accompanying high temperature, burn away any carbon deposits on the spark electrodes that might normally result in fouling of the gap.

The energy per spark of this ignitor is principally a function of the size of the energy storage capacitors, and the voltage built up on the capacitors. The circuit is so arranged that the breakdown voltage of the spark plug gap which varies with chamber pressure does not influence the voltage built up on the capacitors. Therefore, the spark energy is constant at some predetermined value and is independent of the pressure that exists in the burner.

The finalized ignition system contained several other features that should also be noted. This system is relatively insensitive to fluctuations in supply voltage. Lowering the supply voltage results in a reduced spark repetition rate, but does not change the energy per spark. Operation of the system is not affected by the use of long cables to the spark plugs since a relatively high capacity, and a relatively low shunt resistance can be tolerated across the igniter plug gap. Because of the nature of the electrical circuit, a single damaged or shorted plug need not result in any failure of the remainder of the system. Finally the system contains no moving parts.

### German Aircraft Manufacturing Methods

By August Bringewald  
Republic Aviation Corp.

**T**AKING the experience gained from the machine and automotive industries, Dr. Spiess of Dornier Aircraft Corp., developed a new airframe mass production system—the so-called "Hole Production Method" to solve the following problems: 1. Reducing of operation time; 2. Saving of material, and 3. Reducing of production space.

The idea of the "Hole Production Method" is to complete all the detail airframe parts, including rivet holes, before assembly so that no large jigs and fixtures would be necessary for assembly. Fabrication of minor and major assemblies was accomplished on racks which were moved on conveyor lines. Because the airframe is a very sensitive structure consisting in its external shape of three-dimensional formed skins, it was necessary to find a new way to produce accurate finished parts before assembly.

The effort to find a way to produce accurate tools as routing and drill jigs, led to the development of the so-called "Master Body." The "Master Body" is the first example of an airframe component to be built, incorporating all details, such as bulkheads, stringers, stiffeners, ribs, spars and the entire rivet hole pattern which is provided with drill bushings. Material used to build this "Master Body" was steel, electrically welded to avoid warpage. In the "Master Body," the basic prerequisite of making two exactly matching jigs for three-dimensional airframe components was found and from this, as a sequence, production of accurate detail parts.

The "Hole Production Method" makes the following groups of tools necessary: 1. Templates for bulkhead and rib flanges; 2. Cutting fixtures for bulkhead and rib flanges; 3. Assembly and drill jigs for bulkheads and ribs; 4. Cutting and drill jigs for stringers, and 5. Cutting and drill jigs for skins.

These tools are developed from the "Master Body." The procedure to produce these tools is the following: Thin sheet metal is stretched around the portion of the "Master Body" from which the tool is desired. Then stiffeners are welded to the sheet to give the tool the necessary stiffness. The rivet holes and cut-outs are determined from the "Master Body." After the tools are removed from the "Master Body," the rivet holes in the sheet tool will be provided with drill bushings.

### Tractor Use of Liquefied Petroleum Gas

By Marvin J. Samuelson  
Minneapolis-Moline Co.

**I**N all farming operations a certain amount of idling always takes place. Partial loads are the general rule, so any comparison of fuel consumption between LP gas and gasoline should take idling into consideration. (Turn to page 86, please)

41st Annual National

# Motor Boat Show

*Outdoes Previous Exhibits*

**A**LTHOUGH conditions in the boat and engine industry are no different from those with which practically all of the automotive industries are faced, this was not in evidence at the 41st Annual National Motor Boat Show. For the first time in the history of the national show, all available exhibition space was sold out. A total of 24 cruisers, 34 sailboats, and more than 200 inboard and outboard runabouts, in addition to hundreds of engines, accessories, and supplies were on display at the Grand Central Palace, New York, from Jan. 12 to 20. Attendance was about equal to that of last year, and exhibitors reported a large volume of business.

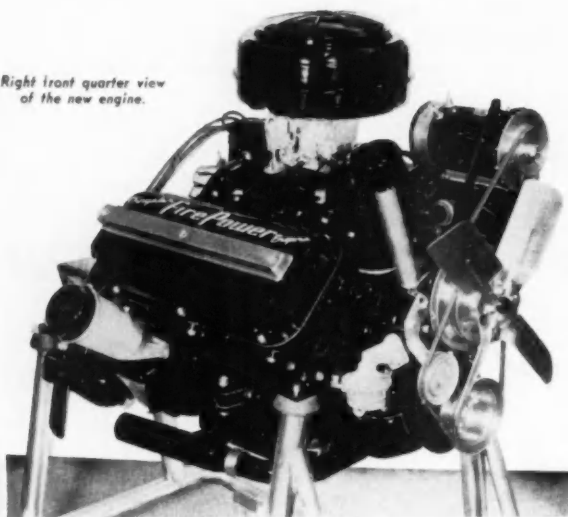
Among the new inboard engines exhibited was a six-cylinder, two-stroke marine Diesel made by Detroit Diesel Engine Division of General Motors Corp. Rated at 275 hp at 1800 rpm, it is equipped with hydraulic reverse and reduction gears and is provided with pumps for both heat exchanger and raw water. Four new gasoline engines were shown by Nordberg Mfg. Co. Their horsepower ratings are 80 at 2500 rpm, 9500 at 3200 rpm, 110 at 2500 rpm, and 145 at 3200 rpm. Recent additions to the line of Universal Motor Corp. were the Stevedore series of 130 hp and the Express of 145 hp. Included with other engines at the booth of the Buda Co. was a new Diesel utility unit which combined a three kw generator, two-stage air compressor, and 90 gpm bilge pump.

Several entirely new models were displayed by the manufacturers of outboards. Evinrude Motors introduced its new Big Twin, an alternate-firing 85-lb unit developing 25 hp at 4000 rpm. This motor features twist-grip control of spark and throttle, and is equipped with a gearshift arrangement for forward, neutral, and reverse. Another new 25 hp two-cylinder, alternate-firing motor also was exhibited—the Johnson Sea Horse which has a special stern bracket for quick adjustment of the thrust socket, and a new type waterproof magneto. A 70-lb. 18 hp motor with forward, neutral, and reverse controlled from the steering arm was shown by Martin Motors. It is a new addition to the company's line for 1951.

Reverse gears which appeared on an increasing number of makes of outboards last year were offered by practically all makers for 1951. Special lower units with gear cases, exhaust outlets, etc., designed for still less resistance in the water were offered as optional equipment by two outboard motor manufacturers.

Two cruisers with plastic hulls were displayed. While the trend has been toward wider use of plastic for small boats during recent years, this is the first time that cruisers of 23 and 24 ft have been offered.

Right front quarter view  
of the new engine.



# Chrysler

## Develops

WITH the introduction of its 1951 line, the Chrysler Division of Chrysler Corporation, presents a high performance, high compression, overhead valve V-8 engine for use in Chrysler New Yorker and Imperial models. Stemming from a period of some five years of development work, this engine is compact and light weight, features a hemispherical combustion chamber with lateral overhead valve arrangement. Developing 180 bhp (gross) at 4000 rpm with compression ratio of 7.5 to 1, the engine will provide this performance with available commercial fuels of "regular" grades.

Condensed mechanical specifications of this engine, compared with the 1950 in-line 8, are given in the table. Further comparison of gross bhp and torque will be found in Charts I and II.

Since durability was a prime objective in the design of this engine, no concessions were made to weight reduction where service life was a factor. Consequently, weight reduction is moderate by comparison with the in-line 8. For example, the weight of the engine, dry and with the M-6 transmission is 923 lb, compared with 1002 lb for the in-

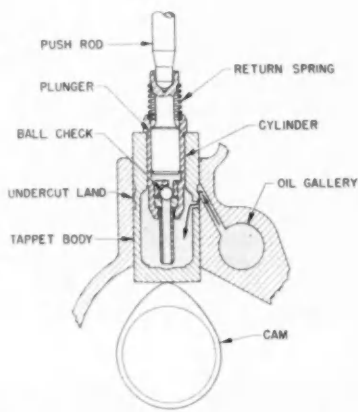
line 8. This is a reduction of eight per cent, although gross horsepower is 33 per cent greater. On the basis of weight per hp, the V-8 is 5.13 lb/bhp as compared with 7.42 lb/bhp for the in-line 8.

Reference to the illustrations will emphasize the short rigid cylinder block structure which is extremely stiff in all planes. The two cylinder banks are tied into the crankcase by five reinforced webs which also carry the camshaft and main bearing lines.

Similarly, the five-bearing crankshaft is short and rigid, fully counterbalanced by six counterweights. Overall length is 26 9/32 in. as compared with 37 17/32 in. for the in-line 8.

The short stroke permits crank pins to overlap the main bearing journals to a greater extent, thus further increasing crankshaft stiffness. Although the combination of high torsional rigidity and low torsional stresses is inherent in this engine, a torsional damper is provided to eliminate the effects of minor torsional vibrations.

Easily one of the most significant features is the adoption of a hemispherical combustion chamber with lateral valve arrangement. Stemming from extensive design studies, Chrysler has developed the arrangement noted in the cross-section featuring push rods and rocker arms operating on twin rocker shafts to drive the widely separated valves. This combination has made it possible to locate the spark plug near the geometrical center of



Longitudinal section through hydraulic valve lifter. The plunger and cylinder assembly is a replaceable unit, interchangeable among tappet bodies.

# Overhead Valve V-8 Engine

## 180 BHP

the combustion chamber with both the spark plug and ignition cable enclosed and sealed, as shown.

Attention also was given to the development of a valve train free from vibration and noise, and having durability and low weight. The camshaft is short and rigid, and is mounted on five precision bearings. Cam contours and valve spring characteristics have been

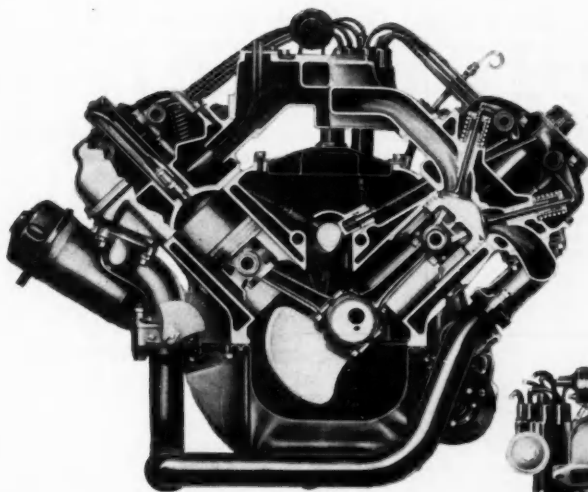
designed to secure high valve lift and positive valve action.

The engine is fitted with improved hydraulic valve lifters of zero clearance type. Engine oil is fed to the tappet through restrictive inlet grooves which aid in excluding air bubbles. Objectionable noise is further reduced by means of the inlet tube within the tappet so designed as to reduce the possibility of air bubbles reaching the ball check.

In these tappets the plunger and cylinder assembly constitutes a replaceable unit, interchangeable among tappet bodies, thus simplifying service. The lower end of the cylinder bore is undercut to prevent sticking due to varnish deposits.

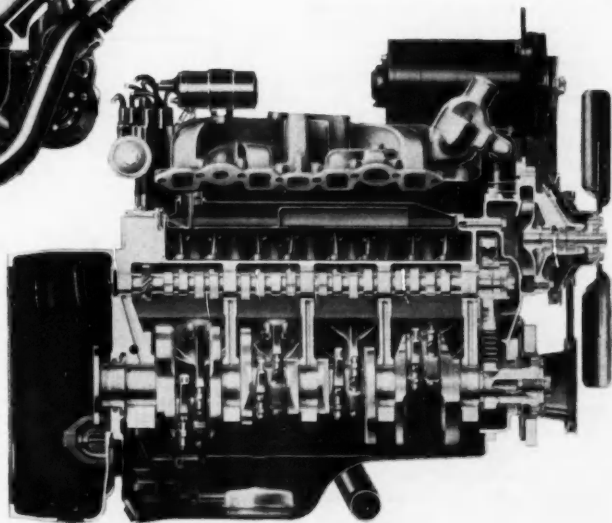
It is of interest to examine some of the basic design features of the engine in detail. Consider first the claims made as to the advantages of the hemispherical combustion chamber, as follows:

1—High volumetric efficiency is achieved through improved breathing by the use of large valves, free-flowing intake and exhaust ports, and relative insensitivity to fuel deposits. Valve timing has been selected to provide optimum performance under all operating conditions.



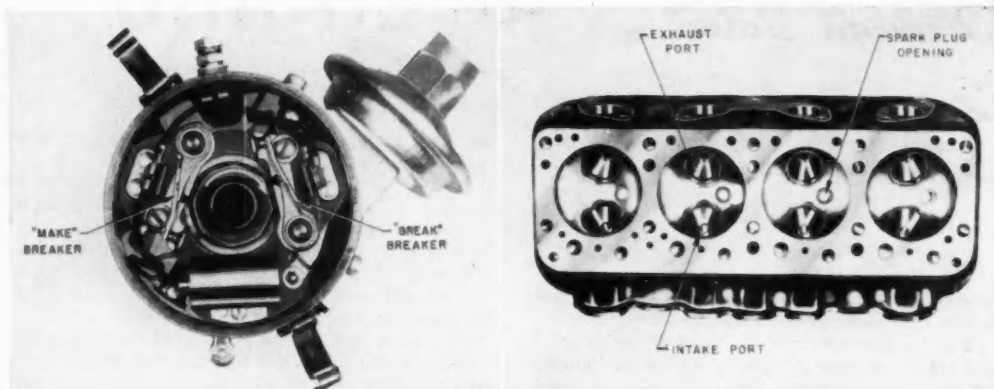
This cross sectional view shows arrangement of valves, rocker shafts, hydraulic valve lifters, and other components.

Longitudinal section view of the engine showing details of water pump, crankshaft, timing chain and sprockets, etc.





# CHRYSLER V-8 ENGINE



(Left) Dayble-breaker ignition distributor. (Right) Valves are arranged in two rows and spark plugs are located near the center of the combustion chamber as seen in this illustration of a cylinder head.

- 2—High thermal efficiency and low specific heat rejection are products of low surface-to-volume ratio, compactness of the combustion chamber, and the short direct exhaust porting. Although the output of this engine is 33 per cent greater, radiator core area has been reduced approximately 18 per cent while fan diameter, number of fan blades, and fan speed have been reduced.
- 3—Outstanding combustion characteristics are credited to what is termed an ideal chamber form, the central spark plug location, and absence of hot spots.
- 4—Excellent adaptability to higher compression ratios results from the ample space for increase in valve size, accurate manufacturing control of combustion chamber volume, and inherent structural strength of the domed chamber. These elements will readily permit increased compression ratios when and if higher octane fuels become a reality.
- 5—Greater valve durability arising from well cooled valves and rigid valve seats.

A reduction in sliding friction comes from the adoption of a new three-ring piston, using two narrow compression rings in combination with a single oil ring having narrow contact lands and a wide drain groove. It is claimed that this oil ring provides oil control equal to or better than the two oil rings used previously. Piston expansion is well controlled by steel struts in the skirts.

Intake manifold design has been developed with the objective of high volumetric efficiency and good fuel distribution. The intake manifold is divided into two principal sections, each with a separate riser

(Turn to page 54, please)

## Condensed Mechanical Specifications Comparison Chrysler V-8 Engine With 1950 Chrysler In-Line 8

	1951 V-8	1950 In-Line 8
Valve arrangement..	Overhead Valve	L-head
Bore (in.)	3 1/4	3 1/4
Stroke (in.)	3 5/8	4 7/8
Displacement (cu in.)	331.1	323.5
Compression ratio	7.5 to 1	7.25 to 1
Brake hp (max.)	180 @ 4000 rpm	135 @ 3200
Torque (max.) (lb ft)	312 @ 2000 rpm	270 @ 1600
Bhp/cu in. disp.	0.544	0.418
No. main bearings	5	5

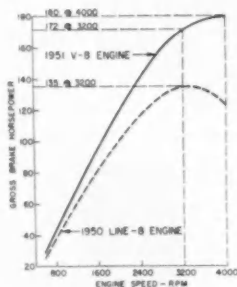


Chart I—Gross brake horsepower of 1951 V-8 engine compared with that of 1950 in-line 8.

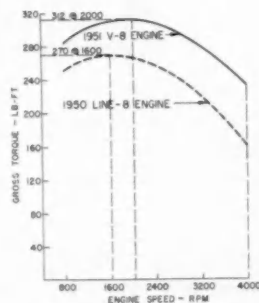
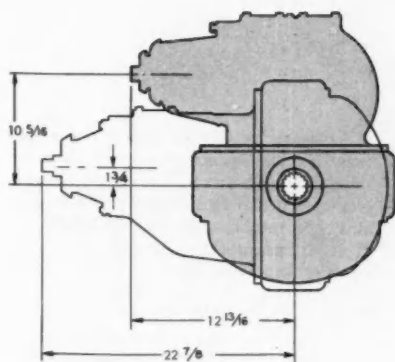


Chart II — Comparison of gross torque of 1951 V-8 engine and 1950 in-line 8.



This diagram shows comparison between top-mounted final drive unit of R-330 series rear axle (shaded) and front-mounted final drive unit of standard series R-300 rear axle (unshaded).

**A** NEW heavy-duty, two-speed, hypoid-helical double-reduction rear axle designed expressly to solve the drive line problem introduced by the necessarily close-coupled mounting of major units in the chassis of heavy-duty, extremely short wheelbase truck tractors for highway hauling is a recent development of the Timken-Detroit Axle Co. This new axle, known as the R-330 series, makes possible the use of large engines and transmissions in these short wheelbase truck tractors in combination with a heavy-duty, two-speed rear axle designed to eliminate problems of propeller shaft length and angularity.

The R-330 series rear axle is a modification of the R-300 series—one of the line of Timken-Detroit 3 for 1 rear axles. All the advantages of hypoid gearing in a two-speed double-reduction final drive are retained in the design of this new axle but the arrangement of internal gearing is such as to provide top mounting of the final drive unit instead of the conventional front mounting.

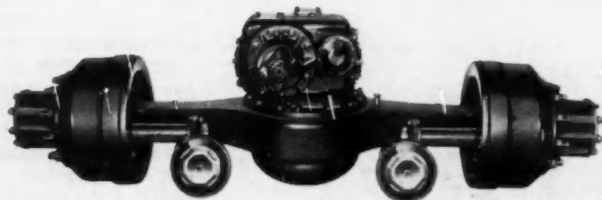
As compared with the conventional front mounting, the top mounting of the final drive

## Rear Axle Designed for Short Wheelbase Truck Tractors

unit in the R-330 series rear axle provides an important reduction in the dimension from the centerline of the axle to the input end of the hypoid pinion. Thus for extremely short wheelbase tractors a longer propeller shaft can be used. Another important consideration of drive line geometry is the height of the drive pinion shaft. Top mounting of the final drive unit results in a much higher pinion shaft location as compared with the pinion shaft location in conventional front mounted final drive units. This increased height of the drive pinion serves to straighten out the drive line and aids in the elimination of angles in the mounting of the engine and transmission units.

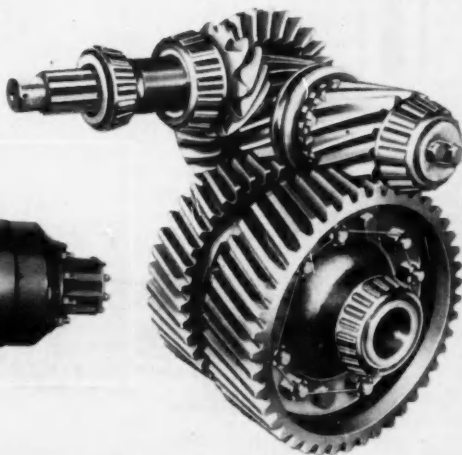
This axle is designed specifically for short wheelbase highway tractor applications and its torque capacity is designed for modern, high power engines used in over-the-highway tractor-trailer service. The internal parts of the final drive unit, such as differential, drive gears and axle shafts, are the same as used in the conventional R-300 series axle and are interchangeable.

(Turn to page 80, please)



(Above) Timken-Detroit R-330 series rear axle with top-mounted, two-speed, double-reduction drive.

(Right) Arrangement of gearing in the new axle.



**H**IGHLIGHTING the many advanced features of the Chrysler line for 1951 is the new 180 bhp (gross) 90-deg V-8 engine of overhead valve type, with hemispherical combustion chamber and laterally spaced valves, which will be installed in all models except Windsor and Windsor Deluxe. The engine is described completely in a separate article in this issue.

Other outstanding design features, applicable to certain higher priced models, to be noted later, include: Air-cooled disk brakes; Chrysler torque converter drive in combination with the standard M-6 transmission; and the Hydra-guide hydraulic power steering gear. Oriflow shock absorbers, capable of a controlled ride of unusual character on all manner of road surfaces (see AUTOMOTIVE INDUSTRIES, January 15, page 41) are installed as standard equipment.

The line consists of 21 body styles as follows: *Windsor*—6-pass. sedan, 8-pass. sedan, club coupe, Town and Country wagon. *Windsor Deluxe*—6-pass. sedan, 8-pass. sedan, limousine, club coupe, convertible coupe, Newport, and Traveler. *New Yorker*—6-pass. sedan, club coupe, convertible coupe, Newport. *Imperial*—6-pass. sedan, convertible, Newport, club coupe, 8-pass. sedan, limousine.

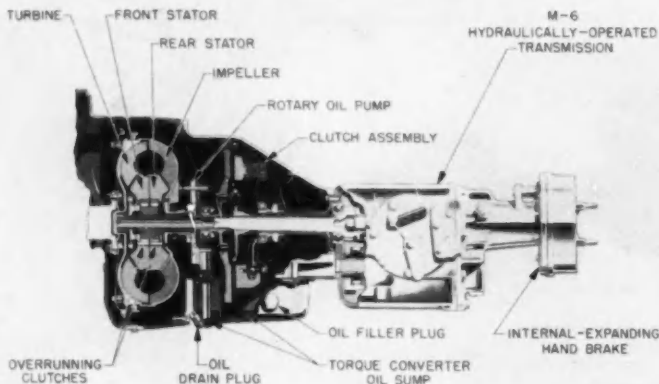
Although wheelbases remain unchanged the cars range from  $\frac{3}{8}$  in. to one in. shorter and narrower overall, without affecting width of seat cushions. While overall height remains the same, an additional  $\frac{3}{4}$  in. of headroom is gained both front and rear by suitable structural changes. Styling changes have been achieved through the use of new ornamentation, new front fenders, a wide sloping hood to improve visibility, and wrap-around rear window which produces an increase of 201.7 sq in. of glass area.

## Chrysler

New grilles, curved bumpers and massive bumper guards both front and rear, and narrow windshield pillars also contribute to the fresh styling treatment.

Improved acceleration and performance stem from the introduction of a new torque converter used in combination with the M-6 controlled type automatic transmission and V-8 engine as standard equipment on Imperial eight-passenger sedan and limousine. It will be available as optional on all other models using the V-8 engine. The torque converter replaces the fluid coupling used previously.

As illustrated, the Chrysler torque converter is of four-element type in which the impeller and turbine are hydrogen-brazed assemblies of steel stampings, while the two stator elements are of cast aluminum. The entire assembly is welded into a sealed unit and is serviced by replacing the complete unit.



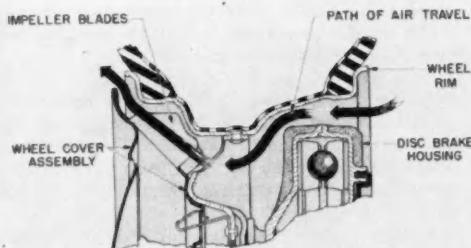
Torque converter  
and M-6 transmission.



*Chrysler New Yorker Newport.*

# for 1951

## ***Offers V-8 Engine, Power Steering and Torque Converter***



*Arrangement of units for forced air cooling of disk brakes.*

It has torque multiplication of 2.34 to 1. When used with the torque converter, the M-6 transmission third speed ratio (high range starting gear) is 1.61 instead of 1.75 for the fluid coupling combination, giving a starting ratio in high range of 3.77 to 1. The low range second speed ratio of 2.04 in the M-6 is available for engine braking, push starts, and extreme torque requirements.

Driver operation is the same as with the fluid coupling combination, except that a greater percentage of driving will be done in high range. Accelerator controlled upshifts and downshifts remain the same within the high and low speed range but it is anticipated that "kickdown" should be required less frequently since torque multiplication is available up to around 45 mph.

Fluid-Matic drive, the familiar combination of the Chrysler fluid coupling and improved M-6 transmission, will continue on all models except the Imperial 8-passenger sedan and limousine.

With the new V-8 engine replacing the former in-line Eight, the familiar Chrysler Six, developing 116 bhp at 3600 rpm, will continue on Windsor and Windsor Deluxe models. Fluid-Matic drive is standard on the Windsor Deluxe and optional on the Windsor, the latter being available with the standard three-speed synchromesh transmission.

Steering effort is materially reduced and greater parking ease is effected with the Hydraguide, a hydraulic steering gear which has been adopted as standard equipment on Imperial eight-passenger and limousine models; and available as special equipment

*(Turn to page 80, please)*



New front fenders and grille, and a wide, sloping hood are among the appearance changes for 1951.

# 1951 De Soto

## *Features Larger, More Powerful Engine*

**D**E SOTO for 1951 will feature the Chrysler Oriflow shock absorbers which are said to offer a new standard in riding comfort; some interesting changes in exterior and interior styling; and the adoption of a larger displacement engine offering increased power and performance. The Oriflow shock absorbers were described in *AUTOMOTIVE INDUSTRIES*, January 15, page 41.

The line provides a selection of eleven body styles in the following models: Custom line—four-door sedan, club coupe, convertible coupe, eight-passenger sedan, nine-passenger Suburban, all-steel station wagon, and the special Sportsman hardtop coupe. The DeLuxe line offers—four-door sedan, club coupe, eight-passenger sedan, and Carry-All sedan.

Tip-Toe hydraulic shift with fluid drive is standard equipment on Custom models, optional at extra cost on DeLuxe models.

Looking first at mechanical details, the new engine (see Table for specifications) has a displacement of 251 cu in., and a maximum bhp rating of 116 for the bare engine. Improved starting and smoother warm-up are assured by the use of an integral automatic choke mounted directly on the carburetor. One of its features is a heat retainer plate placed in front of the thermostat coil. The fast idle also is located within the choke housing.

Improved driver vision, effected by lowering the hood line, is facilitated by lowering the top

of the radiator and moving the overhanging portion of the top tank from the rear to the front to provide fan clearance.

A narrow wedge type fan belt is used on the new engine.

Improvement in the M-6 transmission has been effected to eliminate the possibility of accidental ignition interruption. The ignition interrupter switch now is actuated by a sliding sleeve and a pin on the direct speed rail. Switch contact is made only when the direct speed piston moves back to the low gear position if an upshift has taken place.

More effective hand brake operation is provided with the new internal expanding hand brake on all models equipped with the M-6 transmission. (See description of the new hand brake in *AUTOMOTIVE INDUSTRIES*, December 15.) At the same time greater ease of parking brake control comes from the adoption of a "T" brake handle.

Long life of tie rod seals is assured by the use of Neoprene.

Increased electrical capacity is offered through an increase in generator output rate to 45 amp, using the same basic generator but operated at higher rating.

Increased strength and quietness of front end sheet metal is afforded by a new structural arrangement which forms a yoke connecting the front fenders and fastened to the radiator support. Smoother hood action and more positive closing is effected by re-

(Turn to page 94, please)

### Specifications 1951 Engine

Type.....	L-Head
No. cyl.....	6
Bore.....	3 $\frac{7}{16}$ in.
Stroke.....	4 $\frac{1}{2}$ in.
Displacement.....	251 cu in.
Compression ratio.....	7 to 1
Max. bhp (bare eng.).....	116 @ 3600 rpm
Max. torque (lb ft) (bare eng.).....	208 @ 1600 rpm



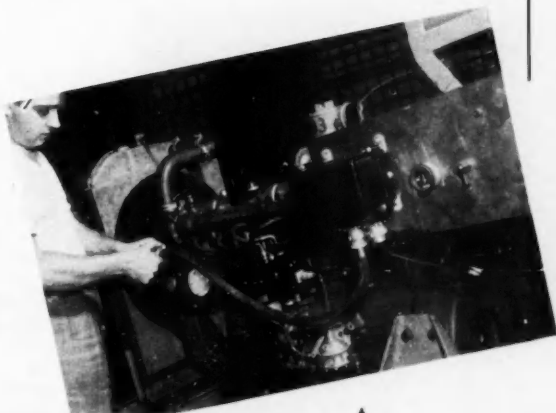
# What Makes the Beaver Waterproof

THE Reo Eager Beaver, developed for Army Ordnance and placed in production recently, is an unusual military vehicle in many respects, particularly in its inherent ability to run with the engine submerged in water. Among the unique design elements contributing to its performance is the specially designed, water-proof type electrical and ignition components supplied by the Delco-Remy Div., General Motors Corp.

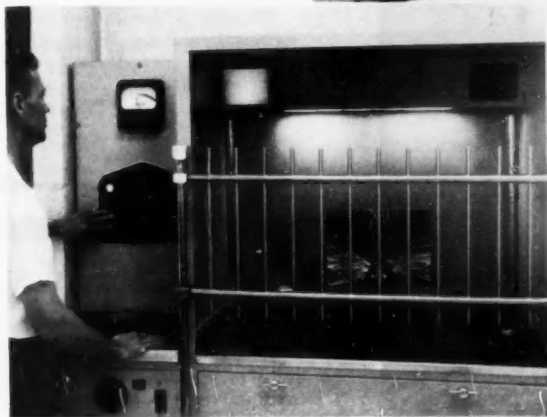
The illustrations reproduced here show some of the special inspection equipment and procedures devised by Delco-Remy to assure the proper operation of the electrical system under conditions of complete submersion. All of the parts intended for the Eager Beaver are subjected to these unusual tests before acceptance.



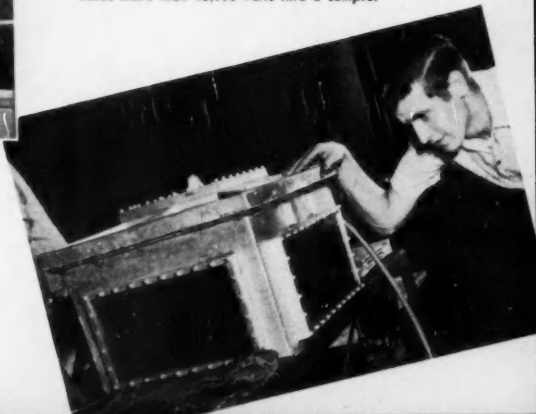
To test the waterproof electrical equipment at the end of each assembly line, every unit is "dunked" in a tank similar to this one. Air is blown into each generator under six pounds pressure. This simulates the water pressure found at a depth of 14 feet. Any leaks in the equipment are quickly shown up by air bubbles.



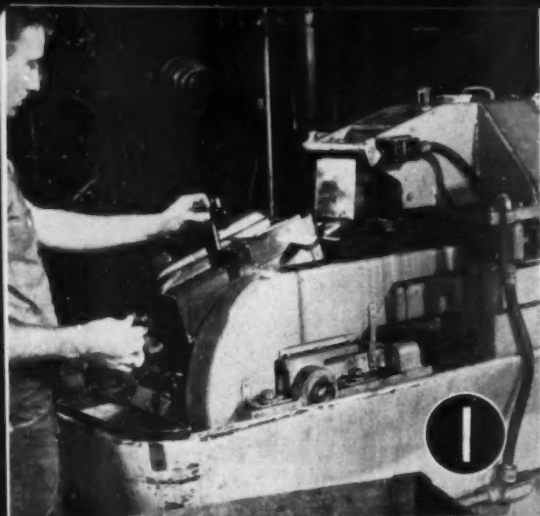
Test engine shows how some of the Delco-Remy waterproof equipment looks when installed. Generator, distributor and voltage regulator are hooked up with special waterproof and suppression-shielded heavy wiring.



Test of insulating material was not devised especially for waterproof equipment, but is used on materials which go into it. Here the operator sends more than 42,000 volts into a sample.



Every regulator assembly coming off the assembly line at Delco-Remy is also given the water test, using several pounds of air pressure. The test bath used is similar to the one developed for generators.



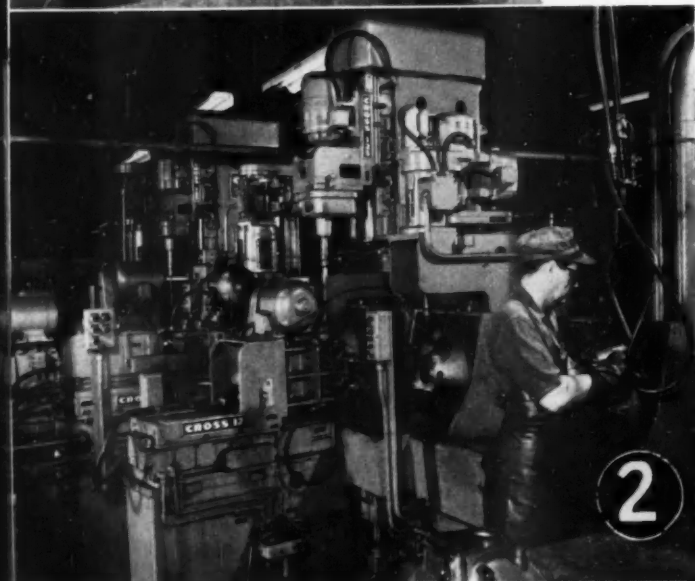
# Some

**F**OLLOWING the introduction of the Studebaker V-8 engine a highspotting of transfer machines and other interesting operations on the cylinder head and cylinder block was published in *AUTOMOTIVE INDUSTRIES*, Dec. 15. The present study is concerned with additional sampling of operations on a number of other elements of this engine, and includes observations on several smaller transfer lines.

Noteworthy modernity is expressed in the compact setup for finishing the set of main bearing caps, using a new horizontal Cincinnati two-way surface broaching machine and an eight-station Baker Bros. transfer machine of unique design.

As is customary, the group of five main bearing caps starts as a single casting in the raw state. It is presented to the Cincinnati surface broach at Station 2 where the parting face is rough- and finish-broached; and bearing locks finished on the two sides. Station 3 finishes the bottom face, taking in the bottom surface of the rear bearing cap; and finishing the bolt bosses.

The work is then shifted to the eight-station Baker transfer machine where the external groove at the rear of the rear cap is milled at Station 1. This is followed by



**1** The compact nine-station Cross Transermatic unit which completes all operations on the clutch housing is seen here in partial perspective.

**2** The parallel faces of the clutch housing are finished in two steps in the enormous Mattison five-head surface grinder. This operation precedes finishing in the Cross Transermatic which may be seen at the left in the background.

**3** Connecting rods and caps are surface broached in the continuous Footburt machine shown here. The operator is seen at the loading station.

# Outstanding Operations

## *at Studebaker V-8 Engine Plant*

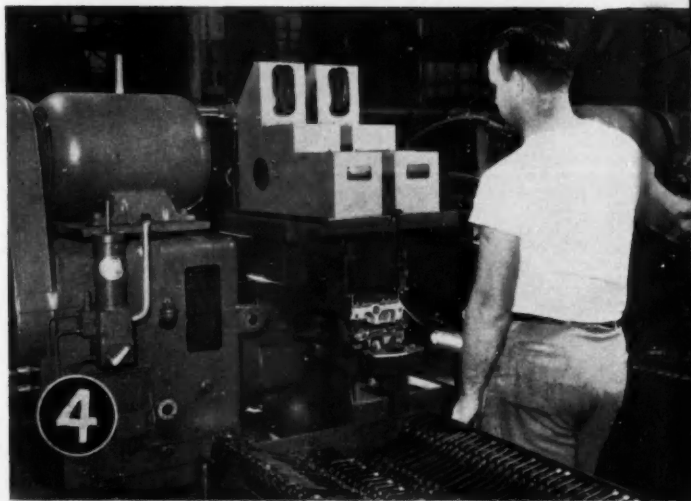
drilling six bolt holes through, and spot drilling at the bottom of the rear cap. The remaining four bolt holes are drilled at Station 3, together with five additional holes. Station 4 is idle. A narrow slot is milled in the rear bearing cap section and an angular hole is drilled part way in the rear cap at Station 5, the latter being drilled through at Station 6. Two holes are tapped at Station 7. Major milling operations are performed at Station 8. Here the notches in all caps are milled, the end faces of the front and rear bearing caps are finish-milled, then the caps sawed apart with slitting saws.

The clutch housing too is completed essentially in two machines—a five-wheel Mattison surface grinder; and a special Cross transfermatic. Fixtures in the Mattison grinder are arranged for double-indexing, grinding first one face, then the other, both faces of the housing being held to close limits for flatness and squareness.

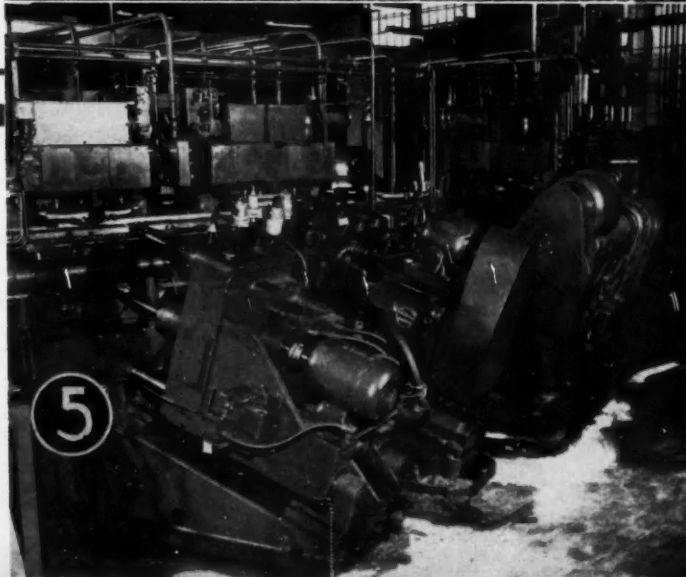
The Cross Transfermatic has nine stations, loading at Station 1, unloading at Station 9. Station 2 handles the drilling of 11 holes in the large face; milling the shaft

## PART TWO

*By Joseph Geschelin*



**4** This is the unique electronically controlled weight balancing machine for connecting rods, developed by Snyder for this application.



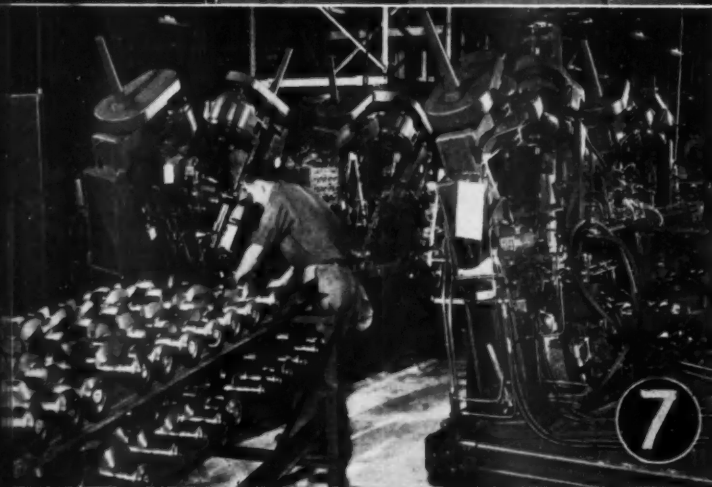
**5** Here is the compact Baker transfer machine for drilling, tapping, and other operations required in processing the bearing cap group.

## Studebaker V-8 Engine Plant



boss; and end milling engine mounting bosses. Station 3 has the following operations: drill dowel holes and starter holes; rough- and semi-finish-bore and chamfer the transmission pilot bore, holding to 4.080-4.085 in.; drill and chamfer the shaft hole. Drilling and countersinking four holes in the transmission face, and drilling the shaft hole are done at Station 4. The four holes in the transmission face then are tapped at Station 5. Station 6 has the following sequence of operations: ream two dowel holes and two starter holes; finish bore transmission pilot bore to 4.1250-4.1265 in.; tap-drill hole in retainer boss. Motor support holes and drain hole are drilled, and shaft holes line reamed to 0.816-0.817 in. at Station 7. Final operation at Station 8 is the tapping of the two motor support holes and one hole in the release shaft boss.

Exhaust manifolds are finished completely in two units—a specially tooled Cincinnati mill; and a special W. F. & John Barnes transfer machine. As illustrated, (Turn to page 100, please)



**6** First operation on exhaust manifolds—milling and surface broaching of pads—is handled in this special Cincinnati mill. The indexing table has two fixtures—one for loading, the other for machining. The pads are milled while passing under the three cutters; then the milled surfaces are finished by a surface broach at the second station in the background.

**7** Milling, drilling, tapping, etc., of exhaust manifolds is done in this special W. F. & John Barnes transfer machine. Unique feature of this unit is the provision of parallel rails for handling two rows of manifolds simultaneously.

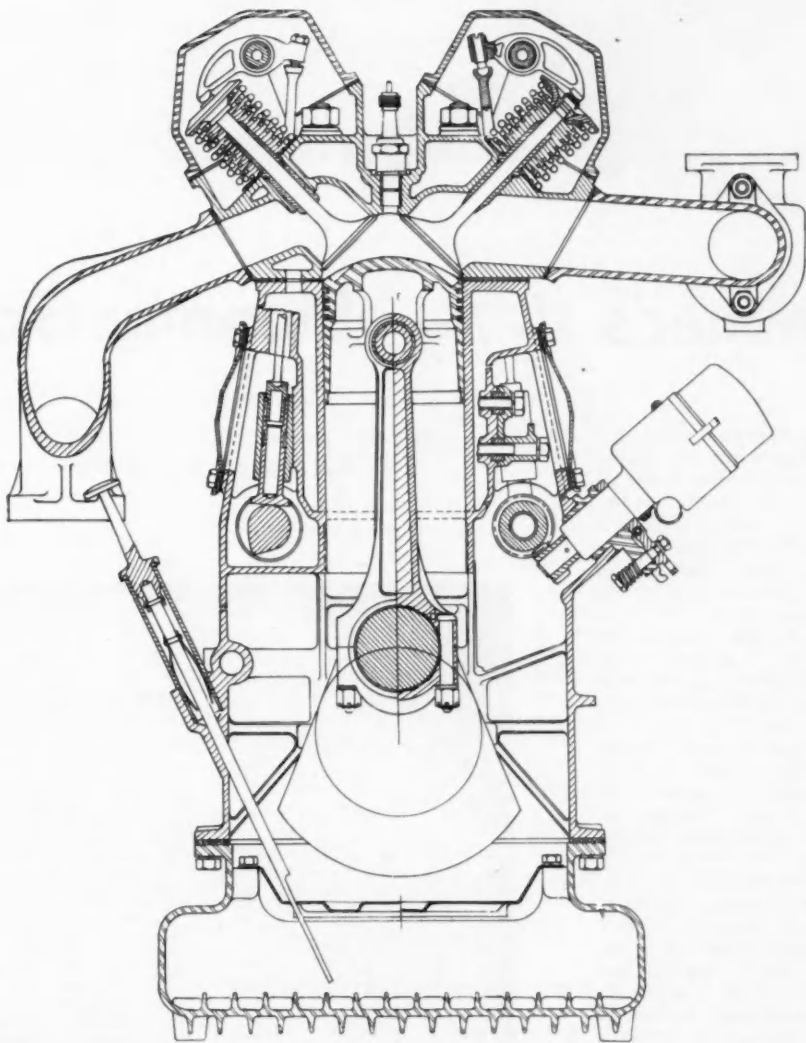
**8** Close-up of two of the special crankshaft oil hole drilling machines supplied by Leland-Gifford.



## Talbot Race Engine

**T**HIS six-cyl French Talbot race engine has a seven-bearing, fully counterweighted crankshaft. As shown, two camshafts, located in the cylinder block, operate the inclined, overhead valves through short push rods. Cast iron is used for the head and

block, while cast aluminum is employed for the oil pan, valve covers, intake manifold and pistons. The engine has a bore of 3.66 in., stroke of 4.33 in., and a piston displacement of 273.5 cu in. Large fins on the oil pan assist in cooling the lubricant.







Complete  
steering  
mechanism.

of effort suffices to move the front wheels with the car standing still.

Although overall steering ratio has been materially reduced from conventional, thus permitting faster steering under all conditions, there appears to be no tendency for over-steering probably because steering effort is so slight. Moreover, when traveling at high speed on the highway steering is extremely stable and control said to be excellent.

As shown in the illustration, the entire steering mechanism is housed in a light and compact unit. The only other major element is the Eaton oil pump combined with an oil reservoir and filter which is mounted remotely, in the case of Chrysler being driven off the rear end of the generator shaft.

## Gemmer's *New Power* Steering Gear,

ONE of the most significant developments in the automobile field is found in the introduction of the Gemmer Hydraguide, design covered by patents by Gemmer Mfg. Co., the first example of a power steering gear adopted as standard equipment in passenger cars. In 1951 it will be fitted as standard equipment on Chrysler eight - passenger and limousine Imperials, and optional on Chrysler New Yorkers and other Imperial models.

Gemmer also is doing considerable development work on large power steering units suitable for tractors and heavy vehicles, although this is still in the experimental stage.

With the Hydraguide power control is instantaneous in response to steering wheel movement. It does not require the driver to turn the wheel back when straightening out after taking a turn. The car recovers naturally and normally as with any conventional steering gear. The reduction in effort on the steering wheel is so marked that a barely appreciable amount

By Joseph Geschelin

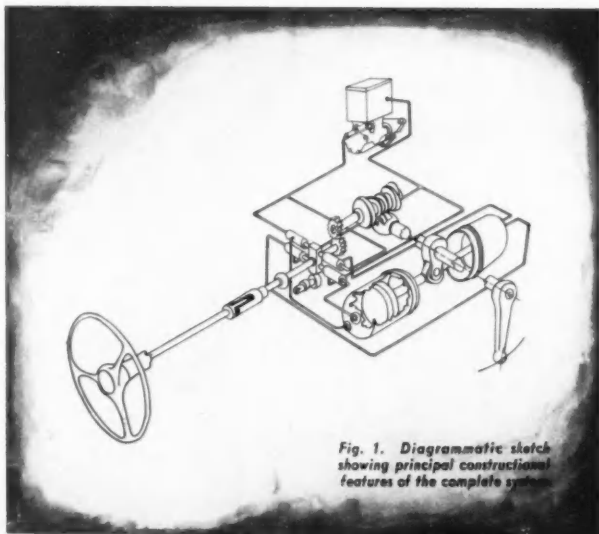


Fig. 1. Diagrammatic sketch showing principal constructional features of the complete system.

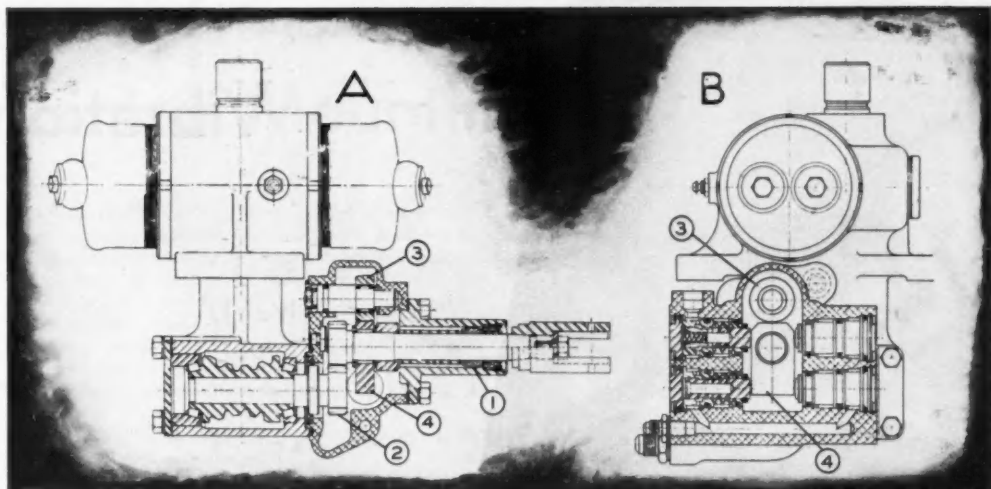


Fig. 2. Cross section (A) and transverse section (B) through the steering gear. Spherical (1), mating spur gears (2), roller (3), valve operating block (4). Roller (3) which holds gears in mesh is mounted on an eccentric shaft permitting suitable adjustment by moving and locking an external lever. The two valves nearest roller (3) are reaction valves which serve to proportion power; the other pair are distribution valves which direct flow to the cylinders, then through the reaction valves.

# the Hydraguide

First Device of Its Kind to be Offered as  
Standard Equipment on Passenger Cars

High pressure oil lines constitute the only connection between the pump and gear box.

The diagrammatic sketch, Fig. 1, reproduced here, discloses the principal constructional features of the unit. In the first place, the steering column is divided into two sections to permit angularity of movement in the section of the column within the gear box. This movement is controlled by means of the spherical bearing at the top end of the gear box housing and is given full freedom of action by virtue of the rubber-insulated coupling immediately above the gear box.

This design permits the steering column to be offset with respect to the worm shaft as shown. The connection between the shaft terminals is by means of two spur gears, the faces of the gears being deeply crowned (0.003 in.)—by crown shaving—to permit proper mating contact despite the angularity of the shafts. Displacement of the gear on the steering column in one direction or the other provides the mechanism for operating the hydraulic circuit.

It is of interest that flexibility of design makes it possible to use special crown-faced bevel gears whenever the arrangement of the vehicle makes it necessary to provide greater angularity of the steering column.

Referring again to Fig. 1, immediately below the spherical bearing is the valve operating block which

makes contact with the "reaction" valves at the bottom and the "distribution" valves at the top of the block. Displacement of the steering column gear in one direction or the other moves the valve block correspondingly, only a slight displacement being necessary to place the valves in operation.

To the right of the worm and gear is the pair of hydraulic cylinders which do the actual work of moving the pitman arm by contact with the intermediate lever.

The oil pump, a small but powerful unit by virtue of its high operating speed, is mounted remotely as shown.

Built in as a part of the pump assembly are two important valves: A high pressure relief valve to bypass the fluid in the event of an abnormal build-up of pressure; and a flow control valve. The latter is a spring-loaded piston valve with an orifice in it so that a uniform quantity of oil is delivered to the steering unit irrespective of variations in engine speed. This reduces the load on the pump from 60 to 75 per cent, a very important saving in power, especially at high engine speed.

It may be mentioned at this point that from the standpoint of safety, the Hydraguide unit can be  
(Turn to page 82, please)

# Vibration

By  
Walter  
Rudolph



**1.** In the press room, worker removes strips of metal and rubber from die which has been opened following bonding at high steam-heated temperature. These strips, of course, have excess rubber clinging to the metal edges of the mountings-to-be.

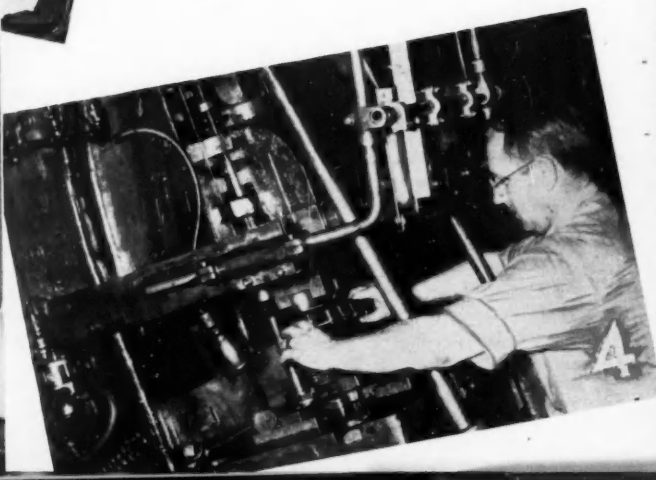


**2.** Finishing includes several stages. First, the specially-adapted 17-in. Delta press rubs excess rubber off metal strips with dull carbide forks.

**3.** Closeup of finishing in the second stage, with Delta 14-in. drill press that has special polishing tool to clean up metal around the rubber center. Drill press bed has special holder to accommodate strip and speed this work.

**4.** Metal strips now go back to the press department, where each mounting is severed from the strip form and assumes a square, round or diamond-shaped shape, according to customer requirements, and also receives Lord patent and serial numbers.

**5.** Where a mounting requires some special forming or assembly work in a press with an individual operation, work proceeds as shown here, with air ejection of piece to rear of press after operation.



# Control Mountings in Production

**S**INCE the early '20's, Lord Manufacturing Co., Erie, Pa., has been engaged in the engineering and manufacturing of vibration control systems—vital for the isolation of destructive vibration in many products and especially important in aircraft. In a nutshell, Lord specializes in the making of comparatively small rubber and steel mountings and couplings which do an efficient job of soaking up noise and vibration wherever incorporated as part of a machine.

By the late '20's, Lord had made some progress in commercial applications, with Lincoln and Nash, among others, ordering engine mounts. Diesel engine operators began to use them, also, to kill the vibration of the big power plants. During the same period, the science of vibration control began to shake hands with commercial aviation.

Test pilots at first were doubtful of the freedom

required in a flexible engine suspension, with the engine shaking considerably during idling. But test flights were successfully passed, and another milestone in safe, comfortable aviation was noted.

About the same time, flight vibration was being tackled by instrument manufacturers with more intensity. Delicate instruments were not guaranteed much beyond 20 hours. Lord then came out with a new type of mounting, in which a flat plate replaced the usual outer sleeve. It was demonstrated at the SAE Aeronautical Section at Cleveland in 1932, and subsequently tested by Sperry Gyroscope Co., revealing that instrument service was upped from less than 100 to almost 1000 hours.

For the record, it is reported that over half of all combat aircraft engine suspensions installed during the last war were developed and furnished by the Lord Manufacturing Co.

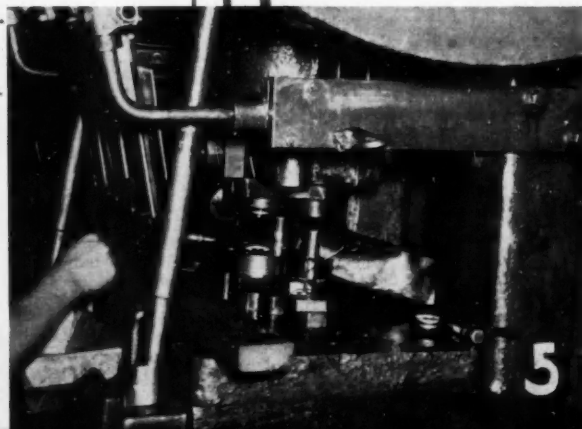
## Torque Converter and Transmission Data on Latest Model Cars

**W**ITH the introduction of a torque converter in conjunction with the M-6 transmission in Chrysler Div. models for 1951 when equipped with the new V-8 engine, the cycle of new automatic transmissions can be considered closed for some time to come. To permit a quick identification of certain major features of current automatic drives, we have reproduced the accompanying chart which is self-explanatory.

The first column gives the number of independent "elements" or "members" in each make of torque converter, the new Chrysler torque converter being of four-element type with two stator or reactor members. Mention may be made that although Ultramatic has only three independent rotating members, the turbine is of two-stage type. The second column gives the ratio of torque multiplication.

Chrysler now has two types of automatic drives, the torque converter and combination with V-8 engines, and the familiar fluid coupling combination for all other installations. Driver operation, however, remains the same in either case, since Chrysler retains the M-6, four-speed two-range transmission with a pedal-operated mechanical clutch. Similarly, it is still necessary to release pressure on the accelerator pedal for making an up-shift.

The column on cooling refers to the arrangements for water-cooling or aircooling the drive. Water cooling is employed with Ultramatic, Dynaflo, and Powerglide, while the Borg-Warner drives use air-cooling with air



circulation through the converter housing. Air is drawn in at one side of the housing and circulated by fins on the pump cover.

The column headed "Start Engine" refers to push starts for a dead engine and indicates the approximate road speed at which the engine should restart. In the case of Dynaflo and Ford-Mercury drives, push starts are recommended in "L" range. Generally speaking, it is recommended that when a push start is necessary the selector lever should be placed in "N," ignition turned on, and when the proper road speed is attained move the lever to "D" or "L" as the case may be.

The last column refers to the automatic clutch for converter lockout which is currently available only on Ultramatic and Studebaker drives.

### Summary Features of Automatic Drives

	Torque Converter	Torque Multiplier	How Cooled	No. Planets	Start. Engine (mph)	Cutout Clutch
Packard Ultramatic	3-element (2-stage turbine)	2.4	Water	One	25	Yes
Buick Dynaflo	5-element	2.25	Water	One	16 in "L"	No
Studebaker (Borg-Warner)	3-element	2.15	Air	Two	10-20	Yes
Chevrolet Powerglide	5-element	2.2	Water	One	12-15	No
Ford-Mercury (Borg-Warner)	3-element	2.0	Air	One compound	12-15 in "L"	No
Hydra-Matic	Fluid Coupling	None	Water	Two	20	No
Chrysler Corp. (with V-8 eng.)	4-element	2.34	Water	None	.....	No
Chrysler Corp. (other models)	Fluid Coupling	None	Water	None	.....	No

## Chrysler New Engine Develops 180 BHP

(Continued from page 40)

supplied by one side of the dual carburetor. Each section, in turn, distributes the fuel mixture through individual branches to the two center cylinders in one bank and the two outer cylinders in the opposite bank.

These branches slope down from each riser exit to the cylinder head intake ports, thus preventing collection of liquid fuel within the intake system. In addition, the various branches have been made of approximately equal length and correlated with the firing order to permit successive firing cylinders to draw air-fuel mixture through opposite risers.

The exhaust system is of low restriction design having separate ports for each cylinder to pass exhaust gases from each cylinder head passage into the manifold extending the length of each bank. A large tube from the center of each manifold conducts the gases to a junction pipe of enlarged cross-section at the right side of the engine.

Despite its high output the engine is said to have excellent fuel economy, actually about 10 per cent higher than for the in-line 8, in terms of miles per gallon. In terms of specific fuel economy, based on dynamometer tests, the engine is two to 27 per cent better than the in-line 8 within the normal operating range.

In addition to the basic features described above, the engine boasts some accessory items of unusual interest. Prime among these is the water-jacketed throttle body in the carburetor which is instrumental in preventing icing and consequent stalling. In addition,

the carburetor is fitted with an improved integral automatic choke having a sensitive thermostatic coil and a vacuum-controlled piston. This is supplemented by a special heat retainer plate designed to control the rate at which the thermostatic coil gains or loses heat. One of its advantages is that it tends to prevent excessive choke action and subsequent flooding when restarting a hot engine.

Finally, one of the most important of the accessory features is the adoption of the double-breaker distributor to provide a hotter and more adequate spark at high engine speeds. The two breakers, as illustrated, are fixed on the mounting plate with respect to each other and to the cam, and so positioned that one breaker leads the other by several cam degrees. Since the breakers are connected in parallel, the primary circuit remains closed as long as either breaker is closed. This results in a longer effective dwell angle, permitting the primary circuit to build up, thus assuring sufficient voltage in

the secondary circuit to the spark plug.

Finally, mention may be made of some miscellaneous details in brief form. Reference to the illustrations of the engine will show that the new water pump is of high output type with impeller shaft mounted on two bearings and sealing handled by a carbon washer and bellows seal. The water pump housing is cast integral with the chain case cover and has two outlets, one to each cylinder bank. The thermostat is of by-pass type mounted on the intake manifold.

Camshaft drive is of silent chain type. Belt drive at the front end is by means of two sets of narrow wedge type belts, the outer belt driving the fan pulley and the inner belt driving the generator from the fan pulley. An idler pulley mounted on a slack-adjusting bracket is provided for the outer belt. As illustrated, the generator is mounted over the center of the engine at the front end.

The lubrication system is of full pressure type, using the rotor type oil pump, and protected by an integrally-mounted full flow oil filter. Rocker arm shafts are fed from the camshaft journals under pressure. The shafts on the left get oil from the No. 2 camshaft journal, while the ones on the right take oil from the No. 4 camshaft journal.

Ignition cable is Neoprene coated. Spark plugs are of special type with built-in 10,000-ohm resistor.

Mention was made earlier of the large valve sizes used in this engine. The intake valves are 1 13/16 in. in diameter, exhaust valves 1 1/2 in.

### Read


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*Regularly and Thoroughly*



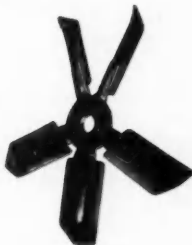
# SCHWITZER -CUMMINS COMPANY

## Specialists in COOLING FANS

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Designing and manufacturing cooling fans, all types and sizes, has been an important part of our business for 31 years. We have produced untold millions of fans for all sorts of services, all over the world. Often we are the only source for fans for large automotive programs, always we are busy producing for a multitude of smaller users whose requirements range through the entire scale of types, sizes and materials and carry all the special features incident to fans. It is routine for us to be asked to develop and build a fan for some problem job of cooling, something that will improve performance or reduce costs, or both.

All this has created a skill and understanding about fans that can be invaluable to any manufacturer using them in his product. If you are in need of a specialist's assistance and a good source of supply, we will be glad to serve you through our engineering and manufacturing groups and the facilities of a fine research and fan testing laboratory.



Illustrated are three outstanding examples of an unusual fan design developed by us—all of the laid-back tip type, all with high capacity and very quiet—one 18" in diameter, 3-blades, one 21" diameter, 5-blades, one 26" diameter, 6-blades. All these fans completely fulfill the objectives of the buyers and save them money. All are in large production. These illustrations present a small example of the diversification of our fan operations.

*A thermostatically controlled fan, simplified and with many advantages for applications where a rate of cooling variable with the work is desirable, is a recent development of our own engineering.*

**COOLING FANS FOR  
OVER 31 YEARS**

**SCHWITZER-CUMMINS COMPANY**

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INDIANAPOLIS 7, INDIANA, U.S.A.

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PRODUCTS

OIL PUMPS  
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AUTOMATIC  
SHAFT SEALS

# Publications

## AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

### A-23 Ball Bearings

New Departure—The new 20th Edition of the company's ball bearing catalog, now ready for distribution, contains numerous added features of interest and value. Selection of bearing type and size for various conditions of load and speed is considerably simplified and illustrated by examples. Load rating tables now give both radial and thrust capacities for all bearings except those types which are designed for certain specialized services, and speeds now have been arranged to include those for synchronous motors.

### A-24 Grinding

Mattison Machine Works — A new booklet, just published, shows a number of jobs which were ground on the firm's grinders during World War II. It shows the method of grinding articulated rods, master rods, airplane engine crank shafts, breech end of gun barrels, breech blocks, breech rings, gun recoil rails, etc.

### A-25 Broaches

Colonial Broach Co.—A timely and useful, new three-color poster chart, entitled "How to Care for Broaches," for wall or bulletin board mounting is offered to users of broaches and broaching machines. The chart is designed for in-plant use to increase broach life, improve their service performance and help lower the cost of maintaining broaches.

### A-26 Pallet Truck

Towmotor Corp.—Now available is a comprehensive, 18-page book, "An Engineering Achievement," in color showing every detail of the firm's new and improved model "W" electric pallet truck.

### A-27 Magnetic Tape Recorder

Magnecord, Inc.—Just issued by the company is a new eight-page booklet covering a complete line of magnetic tape recording equipment. Besides a

list of accessories that are available, specifications are given for each unit.

### A-28 Ball Bearing Centers

Ready Tool Co.—Anti-friction bearing centers are fully described in two new bulletins, No. 483-R and 481-D, recently published. They include: Engineering data and prices on ball bearing centers for carbide cutting tools and grinding operations as well as a diversified line of all-purpose centers.

### A-29 Powdered Metal Products

Powdered Metal Products Corp. of America—A revised catalog, detailing powdered metal fabrication possibilities for various types of parts such as gears, bearings, filters, cams and electronic cores has just been announced.

### A-30 Stainless Steel

Armco Steel Corp.—A new folder describing paper-thin stainless steel has just been published. "Paper - Thin Stainless for Light Vital Parts" shows where stainless steel, 0.010 to 0.001 in. thick, has been used and outlines its manufacturing advantages.

### A-31 Industrial Truck

Baker Industrial Truck Div.—A new eight-page descriptive bulletin, No. 1324, just released translates into user benefits the design and construction features of the firm's FT fork trucks in 3000 and 4000 lb capacity.



**THIS TIME SAVER COUPON** is for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

**Readers' Service Department,  
Automotive Industries,  
Chestnut & 56th Sts., Philadelphia 39, Pa.**

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# Proven from the standpoint of Engine Performance

It may come as a surprise to some engineers that more than two million AUSCO Cast Alloy Steel Crankshafts are giving a very satisfactory account of themselves in mass produced motor cars.

In even heavier service, a crankshaft, run 100,000 miles on a motor bus, was returned to the maker, Auto Specialties Mfg. Co., for careful checking and showed practically no signs of wear. This endurance is credited largely to the series of Quality Controls employed, such as X-Ray photography with the million-volt camera shown here.

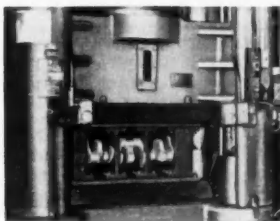
A photographic account of the production and application of Cast Alloy Steel Crankshafts has been compiled, accompanied by brief text explanations. This is being shown to engineers and other automotive officials, by appointment.

**AUTO SPECIALTIES MFG. CO.**

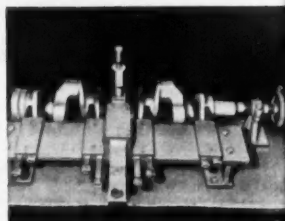
St. Joseph, Mich. Other plants at Benton Harbor, Hartford and Windsor, Ont., Canada.

CHEMICAL COMPOSITION			
	C	Mn	Si Cr
Minimum	1.30	.85	.65
Maximum	1.40	1.00	.80 1.0
	Cu	Ni	Mo P Max S Max
Minimum	.45	.13	
Maximum	.10 .55	.18 .08 .08	

Progress Report No. 3 on the Application of Mass-Produced Cast Alloy Steel Crankshafts to the solution of some of today's Engine Production Problems.



The Hot Straightening and Stress Relaxing Heat Treatment to which Cast Alloy Steel Crankshafts are subjected, accounts for absence of warpage. As a result, these crankshafts have a surprising degree of capacity; also highly wear-resistant pin and journal bearings, as evidenced by impartial laboratory tests.



Greatly Reduced Machining on Cast Alloy Steel Crankshafts is due to elimination of rough cheeking on counterweights—one reason for lower cost. A volume car producer cut machining time from 144 minutes to 85 on each crankshaft, by using Cast Alloy Steel, saving several dollars per crankshaft.

Some of the Proven Advantages of AUSCO Cast Steel Crankshafts, Evidenced by Over Two Million in Operation:

● **LARGER SCOPE MECHANICAL DESIGN**

Engineers are practically unlimited in designing Cast Alloy Steel Crankshafts to meet new engine high compression and high power requirements.

● **REDUCED MACHINING COST**

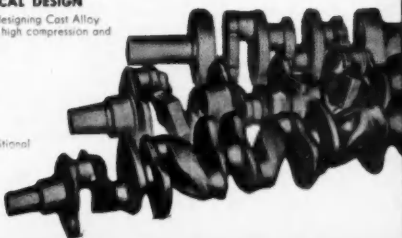
Elimination of rough cheeking operation has reduced machining at least 75%.

● **MINIMUM BEARING WEAR**

Graphic type metal employed provides an additional "inherent" lubrication to journals continuously.

● **GREATER WEAR RESISTANCE**

Evidenced by examples of crankshafts taken out after 100,000 miles, showing only slight indications of wear.



For 15 Years, Successfully  
Mass-Produced  
to Car Factory Specifications

**CAST**  
alloy steel  
**CRANKSHAFTS**  
by **AUSCO**



# • PRODUCTION • EQUIPMENT • PLANT •

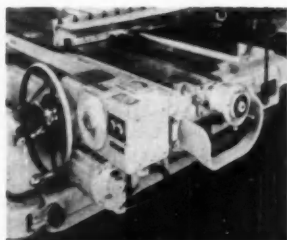
# NEW NEW



FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

## B-11—Jig Borer Measuring System

New huge No. 4E jig borer, designed and built by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., employs an entirely new measuring system for accurately locating large work under the machine spindle. Using certain basic features of the Pratt & Whitney Electrolimit gaging principle, this new method of measuring has been designated the "Electrolimit measuring system."



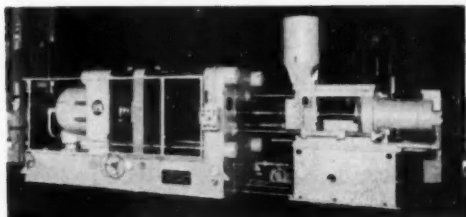
Pratt & Whitney jig borer, No. 4E, having new "Electrolimit" measuring system.

Basic one inch spacing is obtained from a master measuring bar by electrical means, without making physical contact with the bar. The master bar has rectangular projections calibrated so that distance between magnetic centers of adjacent projections is precisely one inch, within a tolerance of twenty-millionths of an inch accumulated error in the full length of the bar. Two of these master bars are built into the machine at right angles with one another, permanently sealed and protected; one 60 in. long on the underside of the table, for positioning the table longitudinally, and one 36 in. long on the underside of the car-

riage, for positioning transversely. Beneath each master bar is an electromagnetic head, which detects the exact magnetic center of each projection on the master bar, as the bar passes over the head, and registers a zero reading on an indicating meter.

The basic one inch spacing is further

Hydraulic Press Mfg. Co.'s improved Model 60-A plastic injection molding machine.



sub-divided by positioning the electromagnetic head between any two projections on the master bar with a high precision micrometer screw. A large  $4\frac{1}{2}$  in. diam micrometer barrel, with wide spaced graduations, permits easy reading for direct settings to 0.0001 in. A separate screw, within the micrometer screw, is used to "zero" the electromagnetic head under the nearest projection on the master bar, when establishing an initial zero position on the workpiece.

Cylindrical reference scales, which revolve as the table or carriage move, are used to rapidly locate the table to approximate settings. The scales read in either direction and are adjustable to set zero for a starting position.

To locate a hole, the operator sets the micrometer for the inch fraction and operates the power rapid traverse until the reference scale reads the approximate setting. Final adjustment is made by handwheel, the exact setting being accomplished when the indicating meter reads zero.

The traversing screws of the two slides have no connection with the measuring system. Therefore errors in the screws, backlash or wear cannot affect the accuracy of the setting. The master measuring bars are sealed in the machine, protected from dirt and chips, and since measuring is accomplished without making physical contact, they are not subject to wear. The high precision micrometer screws are only utilized to position the small electromag-

netic heads, which require a force of only a few ounces. Because all scales are graduated from zero in either direction, locating can start from either end or from the center of the work, depending on how the drawing is dimensioned, without operator having to subtract dimensions.

## B-12—Plastics Injection Molding Machine

Development in plastics injection molding machine design introduced by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, consists of the H-P-M Model 60-A, having "two-part" design—the mold clamp and injection unit are individual and separate units. This development allows for conversion of this new 60 oz capacity machine to 200 oz by installing the H-P-M 200 oz preplasticizing conversion unit. The original all-hydraulic mold clamp and power unit are still utilized when the machine is converted.

The H-P-M 60-A is said to offer twice the injection speed of conventional 60 oz machines and 50 per cent more plasticizing capacity. All hydraulic components are mounted outside the base for accessibility. All electrical controls are housed in a panel cabinet. The machine provides a 1000-ten hydraulic mold clamp, 36 in. maximum clamp stroke, platens 60 in. by 40 in. and plenty of daylight for big molds (60 in.). The low centerline of the machine permits installation without pits or use of operator's platform.

## B-13—Industrial Oven Heater Panels

A new type industrial oven construction composed of low-cost electric heater panels and standardized frame

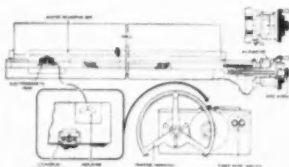


Diagram of the P&W jig borer No. 4E, featuring "Electrolimit."

**FIRST OPERATION**  
(Rear Spindle)

**SECOND OPERATION**  
(Front Spindle)

2.500  
± .005

1.609 ± .005"

**POTTER & JOHNSTON**  
**5D - 2 Spindle - 9"**  
**AUTOMATIC**

## PRODUCES ONE PRECISION-MACHINED FORGING

*with every turret cycle*

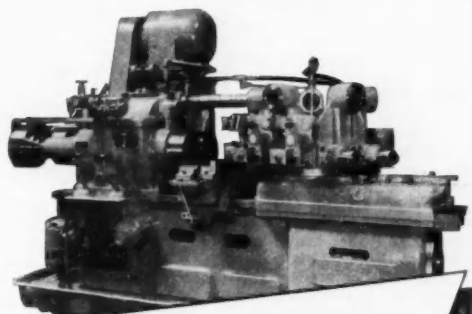


Costs are lowered substantially when work of this calibre is set up on a two spindle machine. This job, and countless others like it, belongs on the P&J 5D-

2 Spindle-9" Power-Flex Automatic. The first series of operations (heavy lines in drawing) are performed on the rear spindle, and the second series of operations on the front spindle. Result: one completely precision-machined part finished with every automatic cycle of the turret. Note the double tooling on each turret face in view at left. The only manual attention is for loading, transferring the work from rear to front spindle, and unloading.

This way, floor-to-floor times are greatly reduced. Labor costs are profitably divided as one operator easily handles two or more machines. Considerable savings are also effected in floor space and power

consumption. P&J Tooling recommendations and time estimates based on your own sample parts or prints are gladly furnished upon request.



**POTTER &  
JOHNSTON CO.**

PAWTUCKET, R. I.  
subsidiary of PRATT & WHITNEY  
Division Niles-Bement-Pond Company



**P&J** 50 YEARS' EXPERIENCE  
IN TOOLING FOR

*Precision + Productivity + Economy*

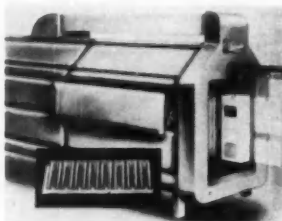


# • PRODUCTION • **NEW EQUIPMENT** • PLANT •

For additional information regarding any of these items, please use coupon on page 56

members is announced by Advance Heating Division of Jensen Specialties, Inc., Detroit, Mich. It introduces the use of high efficiency rod-type heaters mounted on insulated oven wall sections to combine high-speed radiant heating with temperature-controlled convection for industrial heating and drying operations up to 700 F.

Ovens of any size, shape, and heat capacity can be field-assembled from



Advance heater panels for industrial ovens.

standard parts by electric maintenance personnel. Rod heaters of any standard brand name may be specified. When equipped with approved controls and ventilation, the ovens comply with latest industrial oven standards.

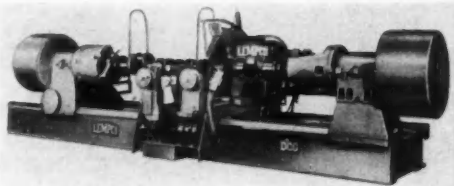
Since no welding is required for assembly, the ovens can be enlarged, extended, or dismantled with changes made in the heating transfer rates, simply by addition or removal of standard catalog parts. Conversion of electric to thermal energy at the point of use takes place without combustion, transmission, or secondary energy losses. To increase the output of continuous-type ovens and driers now in use, whether they are fuel-fired, steam, or electric, Advance heater panels can be added at the entrance end.

From 4 to 40 kilowatts of heat may be installed in each Advance 26 in. by 84 in. panel. Because of this broad range of heating densities the panels suit a wide variety of applications in aircraft, ordnance, and other types of military production.

## **B-14—Multiple-Drive Power Table**

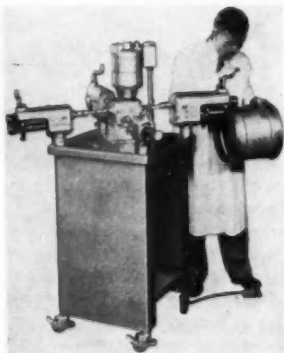
A multi-drive power table for beading, crimping, burring, turning, wiring, flanging, elbow edging, furnace collar edging and a multitude of other sheet metal operations has been brought for-

Lemeco 20-ton crankshaft grinder.



ward by Niagara Machine & Tool Works, Buffalo, N. Y. With it, low cost, hand operated bench machines are quickly converted to power operation.

Two electric foot buttons on the end of a flexible cable, and located on opposite sides of the table, provide controls for the driving motor. Thus the operator's cranking arm is freed and



Niagara Multi-Drive power table for rotary sheet metal work.

both hands can be used to accurately guide the work in the rolls.

With positions on the table for four machines, permanent setups can be made, eliminating the hunting of tools, changing of rolls and setting of gages.

The welded steel table, sturdy, compact and light, is mounted on casters. Power unit consists of a Niagara worm reduction unit mounted on anti-friction bearings and operating in a bath of oil. A ¼ hp., 110 volt, single phase ac motor with reversing switch and over-load protection is flange mounted as an integral part of the power unit.

The table comes complete with eight steel universal joints, four coupling

shafts and all electrical equipment. Existing rotary hand machines can be used or new ones ordered.

## **B-15—Grinder for Diesel Crankshafts**

The principle of the moving grinding wheel has been applied by Lemeco Products, Inc., Bedford, Ohio, in a new 20-ton grinder for the refinishing of Diesel crankshafts up to 18 ft long.

The huge grinding wheel—4½ ft in diam on the largest model—is moved hydraulically on precision ways from journal to journal at selected speeds from 1 to 35 ipm. Hydraulic controls are also used to give rapid, smooth approach and retraction to the grinding wheel.

Adjustment for various lengths of crankshafts is made through movement of the headstock, with the final setting made at the tailstock through an adjustable quill. Head and tailstock spindles are mounted in 12½ in. Timken OD bearings. Shaft is held by 24 in. pot chucks and main bearings are ground between centers.

Overall height is 7 ft. Work is placed at eye-level. Electrical controls are at operator's finger tips, giving complete command of job at all times. Oil pressures to bearings are automatically controlled with visual and audible alarms at operator's station.

Three models are available, accommodating crankshaft swings from 32 in. to 50 in., and lengths from 108 in. to 216 in.—all maximum dimensions. Grinding wheel diams vary from 36 in. to 54 in. with widths from 1 in. to 5 in.

The grinders, weighing more than 40,000 lbs, provide a base as a unit weldment, with hand scraped ways an integral part of the bed. Floor space required is 28 ft by 8 ft.

## **B-16—Sealing Equipment For Porous Parts**

Impregnating equipment for sealing pressure castings rejected because of porosity has been placed on the market by the Tinch Products Co., Sycamore, Ill., designed for the smaller foundries and manufacturers to solve "leaker" problems in small parts and castings.

The process is simple, and the equipment complete, requiring no expensive plant alterations, nor skill for operation. (Turn to page 66, please)

# *The* EATON FREE VALVE



**NATURALLY**  
**FREE**  
to

- remove stem deposits
- wipe away seat deposits
- prevent guttering

*This freedom to turn  
naturally means:*


- Longer valve life
- Maintenance of fuel economy at approximately new engine levels
- Maintenance of power output at approximately new engine levels

Eaton engineers will welcome an opportunity to discuss the application of Eaton Free Valves to engines proposed or now in design.

**EATON MANUFACTURING COMPANY**

CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

 **PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

# NEW PRODUCTS

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## C-33—Addition to Diesel Line

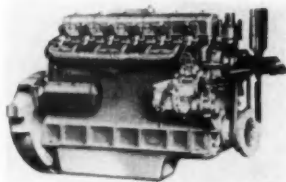
At the Madison Square Garden on February 1 to 4, in spaces 32 and 32-A, at the N. Y. Transport Vehicle Show, the Waukesha Motor Co. of Waukesha, Wis., is introducing the latest addition to its line of Diesels—a 4½ by 5 Six, of 425 cu in. displacement, and rated at 135 hp at 2800 rpm.

In this compact and rugged six cylinder overhead valve engine the crankcase is an alloy casting with heavy outside ribs at the base for maximum stiffness and maintenance of alignment. Internally, the seven bearing bridges tied into the side walls with large-radius fillets, and the thick upper and lower decks make the structure distortion-free, and provide solid support for the renewable dry type cylinder sleeves.

The spherical combustion chamber—feature of all Waukesha Diesels, with its removable two-piece main chamber and twin swirl cups in the piston crown—gives a control to the turbulence rate of the air charge during compression which, it is said, practically gears the turbulence to the engine speed. This increases the rate of combustion as the engine speeds up, and slows the rate down as the engine speed decreases. Sudden uncontrolled shock pressures are thus replaced with smooth, orderly combustion, and a decidedly moderate rate of pressure rise, under all conditions of operation. Results are reduced operating and maintenance costs, clean exhaust and low fuel consumption.

Other provisions are Stellite faced valves and Stellite seats throughout; hardened (300-350 Brinell) renewable cylinder sleeves; aluminum four-ring pistons; seven bearing, 3½ in. drop forged crankshaft with hardened (500-600 Brinell) journals and crankpins; copper-lead high duty precision bearings; full pressure oiling system; American-Bosch injection system with single orifice pintle nozzles and single plunger injection pump; belt driven, front-mounted coolant pump with built-in by-pass and thermostat; and large coolant jacket clean-out plates on the side of the cylinder block.

Only two sizes of the 25 models of gasoline engines produced by this firm will be shown. They are a new high speed six, Model 195-GKA, 4¼-in. bore by 4-in. stroke and rated at 122 hp at 3000 rpm, and the Model 140-GKR.



Waukesha Diesel, 135 hp at 2800 rpm Model 135-DK, having 4½ in. bore, 5 in. stroke, and 425 cu in. displacement.

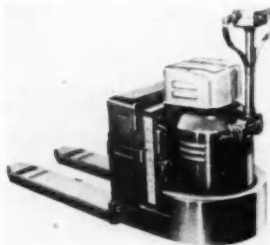
4½-in. bore by 5½-in. stroke, developing 172 hp at its peak speed 2600 rpm. Waukesha gasoline transport vehicle engines can be adapted to burn propane or butane.

## C-34—Improved Electric Pallet Truck

Model "W" electric pallet truck, a product of Towmotor Corp., Cleveland, Ohio, handled pallet-loads weighing up to 4000 lbs. Features are a new contactor panel, a positive-action brake with foolproof dead-man control, improved differential action, and all-rubber, dual trailer wheels for smoother operation.

"Finger-tip" operator controls for either right or left hand, permit the operator to work from any angle in picking up or depositing loads. A key switch provides positive turn off of power to the dual control buttons, preventing accidental or unauthorized use of the truck.

Other features include smooth hydraulic lift, rapid raising of heavy loads, powerful electric drive, and fast, agile maneuverability.

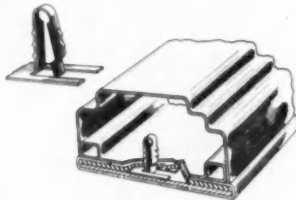


Towmotor electric pallet truck, Model "W".

## C-35—Speedy Fastener For Interior Trim

Installation of interior trim on automobiles is simplified by a specially designed Speed Clip brought out by Tinnerman Products, Inc., Cleveland, Ohio.

The clip is made of heat-treated spring steel, 0.020-in. thick. It consists of a head 31/32-in. long and 5/8-in. wide, from which arises a spring bent into the shape of a dart. The dart-shaped portion of the clip contains barbs. Snapped through a hole in a flat piece of material, this portion of the clip



Tinnerman Speed Clip for fastening interior trim.

contracts and expands, holding the material securely against the head.

Specially designed for holding fabric trim to the center and lower door pillars of an automobile, the clip is passed through a piece of fiber board, and a piece of matching cardboard is placed over the head of the clip. This sandwiches the head. The fabric is then stretched over both pieces of board and secured with an adhesive. This assembly is then simply and neatly snapped into holes provided in the door pillar.

Extra barbs are provided on the dart-shaped portion of the clip to allow for normal panel variations in the pillar. The long, wide-set head of the Speed Clip provides greater contact area on the fiber than the fasteners formerly used. It replaces a serrated nail, a spring clip and a special receptacle type fastener.

## C-36—Ferrous Metal Coloring Process

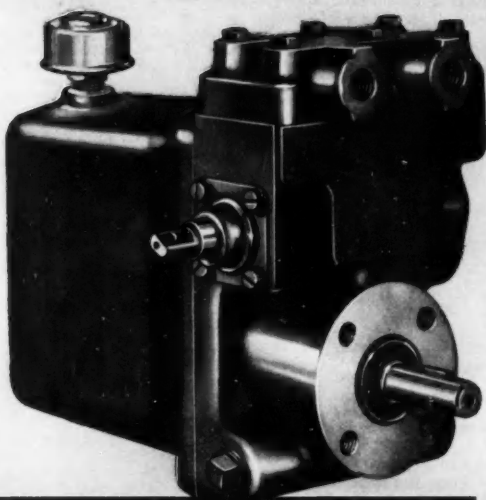
A metal coloring process called Atomite, developed to provide a "blacker 'n' black" rust resisting finish

The Hydraulic "Package"  
of a **THOUSAND USES**

# VICKERS POWER PACK

*Simplifies Hydraulic Design*

*Saves Money,  
Space and Time*



These three applications of the Vickers Power Pack indicate something of the extremely wide usage range of this hydraulic package.

Manufacturers have found it ideally suited to the largest variety of mobile as well as many stationary installations. It provides a compact, self-contained hydraulic system which is quickly and easily installed at low cost. Pump, relief valve, operating valves, oil tank and oil filter are all contained in the rugged, compact unit.

Vickers Power Pack is used on planters, cultivators, plows, stackers, loaders, harvesters, rakes, mowers, dump hoists, lifting tailgates, light duty scrapers, fork lift trucks, loaders, scoops, snow plows, etc. Check into its advantages for your accessory power source.

WRITE FOR BULLETIN 46-48

**VICKERS Incorporated**

DIVISION OF THE SPERRY CORPORATION

1428 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI  
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ROCKFORD • ST. LOUIS • SEATTLE • TULSA • WASHINGTON • WORCESTER

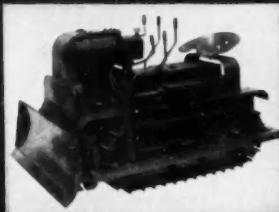
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT  
SINCE 1921

4434



OLIVER COMBINE

Vickers Hydraulic Power Pack provides fingertip, instant control of the twin-cylinder harvester control.



WILCO J-7  
CRAWLER TRACTOR

This powerful little general purpose tractor uses Vickers Hydraulic Power Pack for fingertip control of bulldozer blade (46" wide x 18" deep) and other attachments.



BEACON  
DOCK RAMP

Vickers Hydraulic Power Pack powers vertical movement (24") to level with truck or freight car floors . . . also horizontal movement (14") where outer doors must seal when board not in use.

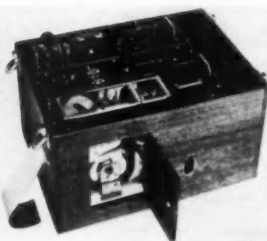
# NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 56

for metal stampings, screw machine products, wire products, springs, castings, etc., is a product of Atomite Black Co., Chicago, Ill. As an undercoat for lacquers, enamels, paints, etc., it requires no baking or accelerated drying. This deep black is stated not to change dimensions of parts or affect those previously heat treated to 300 F. Its low electrical resistance prevents arcing or flashing when welded or "hot crimped," reducing burning of dies and fixtures. It is packed in 200 lb fibre drums only.

## C-37—High Speed Inkless Strain Recorder

A new Baldwin-Sanborn strain gage amplifier and recorder assembly, available from Baldwin Locomotive Works, Phila., Pa., reproduces both static and rapidly changing SR-4 strain gage



Baldwin-Sanborn strain gage amplifier and recorder assembly.

measurements of strains, forces, fluid pressures, displacements, vibrations, acceleration, etc., on a strip chart with rectangular coordinates.

The instrument is a direct-writing, inkless, vacuum-tube voltmeter consisting of an AC powered strain gage amplifier of the conventional modulated carrier type in which the bridge is excited at 500 cycles per second by a built-in oscillator; a D'Arsonval moving coil recording galvanometer in which a current of 10 milliamperes produces a writing arm torque of 200,000 dyne cms, and 1 cm. deflection; and a paper drive mechanism.

In addition to use with strain gages, the instrument can be used with temperature sensitive elements such as the Baldwin Type T-14 and can reproduce any electrical phenomena ranging from a few millivolts to more than 200 volts.

## C-38—Dimensional Air Gage

Offered by Federal Products Corp., Providence, R. I., is a dimensional air gage, the Dimensionair, having a 0.003 in. range which enables determining the size of a hole before reaching the ultimate size required. Irregular and



Federal dimensional air gage, the Dimensionair.

tapered holes are easily gaged. Stability is such that after the gage is in operation drift is entirely absent after a period of hours, days or weeks. Plugs can be inserted with jets at any angle.

Setting the gage is a matter of seconds; simple and positive — with no fussy balancing of controls. The master jet is fixed—requiring no complicating adjustments.

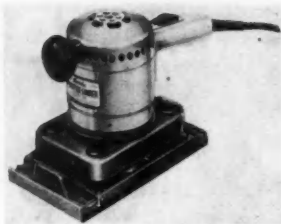
The indicator hand moves quickly and positively to position — no later creeping. The jeweled bearing meter is cushioned at both ends of travel to eliminate damage.

Any air pressure between 40 and 100 lbs can be used, normal fluctuations in pressure not affecting its accuracy. Air pressure at the jets enables the plug to be used at production in coolants or oil.

This air gage measures the dimension variation directly on its graduating scale. Each graduation represents actually 0.00005 in. Amplification is 2500 to 1. Only one master is required for setting. Tolerances are read directly on the scale just as on a dial indicator. Variations as small as 0.000005 in. (5 millionths) are said to be easily determined. There is no changing of dials.

Gage plugs and its hole connections are made finger-tight without wrenches and no major adjustments are required when plugs are interchanged.

## C-39—Light Work Production Sander



Primarily designed for light factory production work, the Smoothie sander, manufactured by the Clarke Sanding Machine Co., Muskegon, Mich., operates horizontal, vertical and overhead positions. With a sanding surface of 4 1/2 in. by 8 in., it is powered by a G-E shaded pole, unit bearing motor cooled by double fans, and operates on 115 volt, AC, 60 cycle current, delivering 3000 cycles per min. Weight is 8 1/4 lbs. Steel parts are rust-proofed by Parkerizing process.

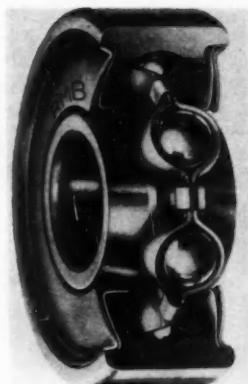
## C-40—Sealed Ball Bearing

Brought forward by Landis & Gyr, Inc., New York, N. Y., is a new ball bearing sealed without any mechanical contact between its stationary and rotating members. Named the R. F. Series, this bearing combines the advantages of a sealed bearing with the freedom of rotation of an open bearing.

In these bearings a capillary chamber is formed by the cylindrical extruded section of the inner cover and the tapered section of the inner race. At that point a permanent capillary film of oil seals the bearing.

The external surfaces of the bearing can be chrome plated. The combination of the capillary seal and the plating produces a corrosion resistant bearing.

(Turn to page 72, please)



Landis & Gyr, R. F. Series sealed ball bearing.

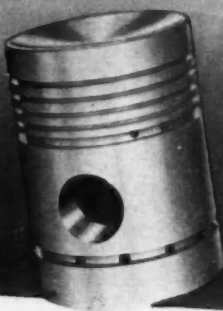




Air Craft



Trunk Type



Diesel



Trans Slot



Wing Insert



Heavy Duty



Wing Insert



Two Cycle



Steel Truss



Turbulator head



T-Slot



Trunk Type

*Every* Type Aluminum Piston  
... *One* Standard of Quality

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Sterling Engineers will work with you as they have with other leading manufacturers in developing pistons to meet your exacting requirements. Wire or phone.



**STERLING ALUMINUM PRODUCTS INC.**

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# • PRODUCTION • EQUIPMENT • PLANT •



(Continued from page 60)

tion. A part or casting once sealed is declared pressure tight for the life of the part, an impregnated casting withstanding any pressure, temperature and chemical condition that the part was designed for.

All metals, both ferrous and non-ferrous, may be sealed by the Tinchin process, either before or after machining. Once an impregnated part has been washed in cold water, no evidence of the impregnation is said to remain except that it is pressure tight.

The sealant is non-inflammable, non-

For additional information regarding any of these items, please use coupon on page 56



Tinchin impregnating equipment for rejected porous parts.

**DESIGNED IN THE**

**1st PLACE**

**NEVER TO TAKE**

**2nd PLACE**

**AETNA BALL & ROLLER BEARING**

**958,725 & 2,140,818**

Protected by U.S. Patent Nos. 1,958,725 and 2,140,818.

**AGAIN IN '51**  
more of the nation's  
leading cars, trucks and tractors will  
be equipped with the Aetna T-type  
Clutch Release Bearing than with  
any other type... a sound reason  
for suggesting that you too, specify  
this first and finest T-type bearing  
for YOUR mobile vehicles.

**Aetna**

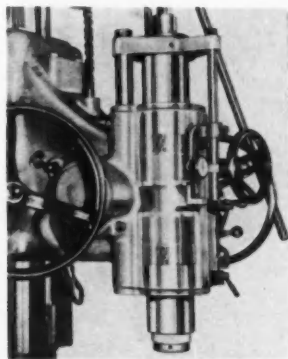
Standard and Special Ball Thrust Bearings •  
Angular Contact Ball Bearings • Special  
Ball Bearings • Ball Retainers •  
Hardened and Ground Washers •  
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Precision Parts

**AETNA BALL AND ROLLER BEARING COMPANY**  
4600 Schober Ave. • Chicago 32, Illinois  
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2457 Woodward Avenue

## B-17—Ball Roll Quill Mounting

New feature on jig borers Nos. 2A and 3B put out by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., consists of a spindle quill which "roll feeds" in a preloaded ball mounting. The device is claimed to eliminate the frequent skilled maintenance required to keep the conventional plain bearing quill mounting operating to "tenth" precision.

Operation of this ball roll quill mounting in the spindle head is accomplished by deep freezing two hardened and ground steel liners, setting them in the head casting, and precision lapping them in place.

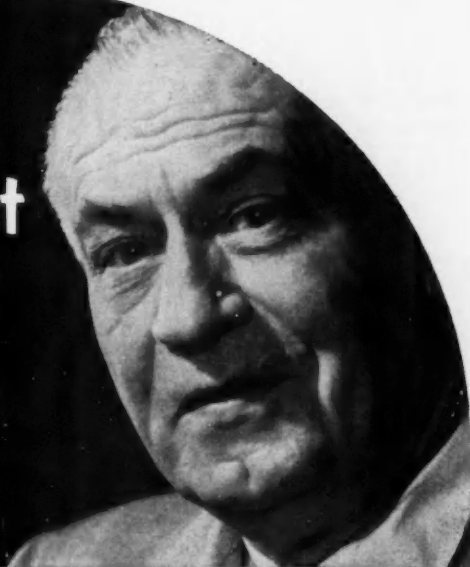


Pratt & Whitney ball roll quill mounting for Nos. 2A and 3B jig borers.

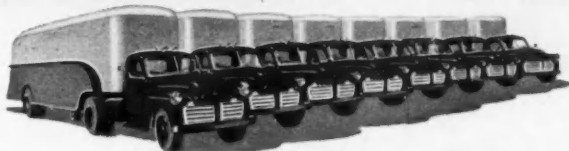
The spindle quill, which is hardened, ground, and draw polished by hand to extreme accuracy and a fine micro inch finish, "roll feeds" on 240 specially selected precision balls, all preloaded, giving a total bearing pressure of 6000 lbs between the quill and hardened liners. Despite this high bearing pressure (Turn to page 96, please)

# "The Soundest Investment I Ever Made"

... AND MY RECORDS PROVE IT!"



## THE BEST BRAKE



Truck operators, like all practical businessmen, know a good investment when they see it. That's why you'll find trucks equipped with Bendix-Westinghouse Air Brakes on all kinds of hauling jobs. Old hands in the trucking business know from experience that these mighty brakes really pay off—with interest! Extra safety, positive braking control and faster trip speeds are only part of it. Of equal importance are the remarkable savings—savings on maintenance and parts replacement costs and in reduced down-time—savings that mean *more* profits. It's easy to take advantage of these extra dividends. Just remember, whether on old trucks or new, be sure to specify dependable, economical Bendix-Westinghouse Air Brakes—world's safest power-to-stop!



# AIR

THE BEST AIR BRAKE IS

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY  
ELYRIA, OHIO

# NEW PRODUCTS for AIRCRAFT

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

## R-12—Floating Anchor Nut Assembly

Airframe and aircraft engine manufacturers find usefulness in a new Platelok floating anchor assembly put

out by Boots Aircraft Nut Corp., Stamford, Conn. The assembly incorporates the Plate-Lok nut in a light, compact, floating anchor base.

Bases are steel, stainless steel, or aluminum alloy, available in styles to suit the method of attachment desired. Sufficient float compensates for small discrepancies in hole position, etc. Nuts are made of steel, in sizes 8-32, 10-32, and ¼-28.

The Boots Plate-Lok is an adaptation



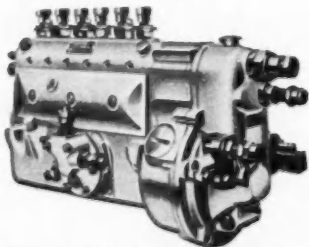
## Confidence Abroad



*Transport operators all over the world have learnt to trust this sign.*

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

Wherever vehicles fitted with C.A.V. Fuel Injection Equipment are exported—whether to Trondheim, Santiago, Hong-Kong or Sydney—there's a service agent or depot to give it the specialist attention needed for such high-precision equipment.

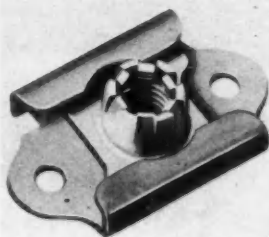


**Fuel Injection and Electrical Equipment**

*Service Depots throughout the World*

C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC., NEW YORK 19, N.Y. Sales Office: 14020 DETROIT AVE., CLEVELAND 7, OHIO

Ⓢ174-344B



Boots Plate-Lok floating anchor nut.

of the Hex-Lok hexagonal lock-nut. Locking section is formed by depressing six threaded flanges inward and downward to exert positive pressure against the bolt and body. Construction is one-piece, all metal. Reusability is said to be high, of importance when the nut is adapted to anchor applications.

## R-13—Electro-Mechanical Actuator

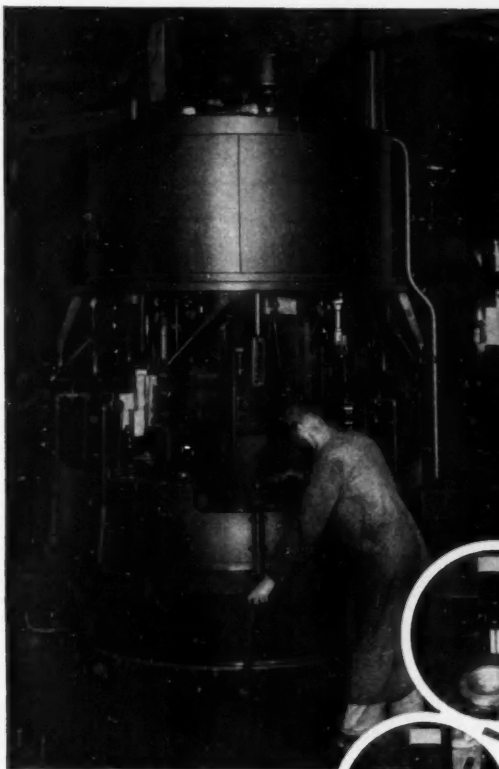
A new linear type, electro-mechanical actuator, capable of operating at temperatures as low as -105 F has been perfected by the Hydro-Aire Corp., Burbank, Calif. The actuator is designed for operation of carburetor preheat valves, trim tabs, canopies, air duct doors, turbo selectors, anti-icing controls, ground oil coolers, heat exchanger scoops, inter-cooler air shutters, propeller anti-icing and other special applications.

Operating time in either direction is 8 seconds. An integral brake stops over-travel under full load within 0.02 in. after power has been shut off. Maximum current drain is 25 amps.

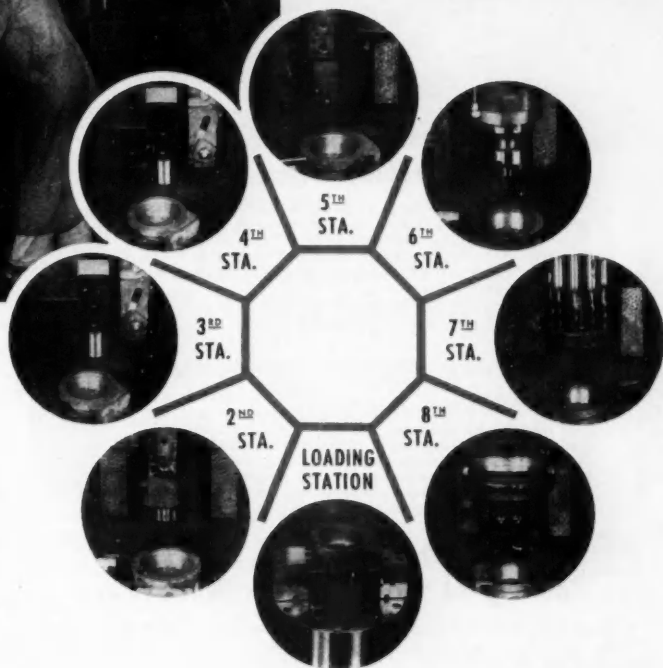
(Turn to page 70, please)

# A KEY UNIT TO LOWER COSTS

Whether Multi-Au-Matic are used for Versatility or in variety of the starter run jobs or tooling for volume production, users have for many years recognized these machines. "Key units in lowering our manufacturing costs".



- 1st Station—: Loading
- 2nd Station—: Rough Bore—Three Diameters
- 3rd Station—: Rough Face—Three Surfaces
- 4th Station—: Finish Face—Three Surfaces
- 5th Station—: Finish Bore—Three Diameters and Chamfer
- 6th Station—: Precision Bore—Two Diameters
- 7th Station—: Multiple Drill—Ten Holes
- 8th Station—: Multiple Tc<sub>2</sub>—Ten Holes



Many of today's economic problems are being solved through lower manufacturing costs. A Multi-Au-Matic installation may be the solution to some of YOUR PROBLEMS.

Let Bullard engineers study your manufacturing methods with a view towards reducing your manufacturing cost via the Multi-Au-Matic Method. Write for Multi-Au-Matic "Pictorial".

**THE BULLARD COMPANY**  
BRIDGEPORT 2, CONNECTICUT



# LIPE

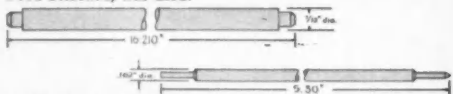
## Automatic Magazine Loading BAR FEED

*Averages  
Net Gain of 78%  
in running time!*



### Another Record

**THE JOB . . .** At L. C. Smith & Corona typewriter plant, Syracuse, N. Y., such operations as cut-off, chamfering, shaping ends, knurling were done on 14 different jobs, ranging in length from 5 1/4" to 16 1/4". A Model 00 B & S Screw Machine having a Lipe Automatic Magazine Loading Bar Feed attached, was used.



**THE RESULTS . . .** On running time alone, a net gain of 78% was averaged over the 14 separate jobs. And that's not all! A minimum of 30% was also gained in production because the screw machine does not "cut air" when it is left running unattended by the operator. Therefore, the overall result on these widely varied jobs is an average increase in total production of 108%.

## BIG Production Gains

on a great variety of work Because . . .

- Stock is fed to screw machine all the time — not dependent upon operator.
- Pressure constantly behind stock.
- Eliminates feed fingers.
- Avoids multiple feed finger feed-outs.
- With Model AML you get maximum output of screw machine — no "cutting air."
- Saves in changeover set-up time.

➔ Upon request we will be glad to send you a time chart showing the separate savings of the 14 jobs referred to in the case history above. Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers are glad to study your problem. No obligation.



*Li*pe - ROLLWAY CORPORATION

Syracuse 1, N. Y.

## New AIRCRAFT PRODUCTS

For additional information please  
use coupon on page 56

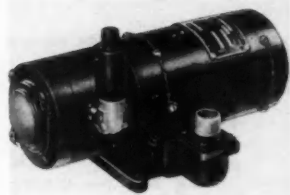
(Continued from page 68)

Duty cycle is one minute on, 15 minutes off. Ambient temperature range is -100 F to +165 F. The actuator is equipped with positive non-jamming stops and adjustable load limit switches, and can handle a 200 lb axial compression load and a 100 lb tension load. It is provided with squirrel cage induction type motor, 115 volt ac, single phase 400 cycle.

### R-14—Oil-Free Air Compressors

For pressurizing radar installations in high-altitude airplanes, a new series of oil free air compressors designed to USAF specifications to replace old-style rotary gear pumps, has been brought out by Lear, Inc., Romec Div., Elyria, Ohio. Units are self-lubricating, continuous duty, compact, and high capacity.

Pump-and-motor rotor shaft runs on three ball bearings, prelubricated for 1000 hr normal service life. Sliding blades are self-lubricating Graphitar (carbon-graphite composition). No seals or shaft packing is required in



Lear-Romec oil-free air compressor, Model RG-3160.

the closely fitted pump for standard suction of 2 in. Hg abs. Blades and rotor are the only moving parts, with no gumming or sticking, and with positive starting and pumping at -67 F.

The device maintains sea-level pressure from 35,000 to 50,000 ft altitude. It is rated at 80 cu in. per min. at 7 in. Hg absolute inlet suction, against an outlet back pressure of 32 in. Hg absolute.

Air compressors operate with AC or DC motors. Available equipment includes assembled pressurizing kits which are fully automatic, consisting of inlet type air filter-dehydrator, absolute pressure switch, system check valve, and mounted-on shock and vibration resistant panel.

# MORE FOR YOUR MONEY

**WITH BENDIX SCINFLEX**

## ELECTRICAL CONNECTORS

### MOISTURE PROOF

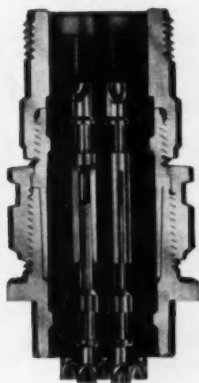
#### PLUS

- Pressure Tight
- Radio Quiet
- Single-piece Inserts
- Vibration-proof
- Light Weight
- High Insulation Resistance
- Easy Assembly and Disassembly
- Fewer Parts than any other Connector
- No additional solder required

The importance of a completely moisture-proof electrical connector can scarcely be exaggerated. But in addition to this important characteristic, there are a host of other exclusive features that make Bendix Scinflex connectors outstanding for dependable performance. For example, the use of Scinflex dielectric material, an exclusive Bendix development of outstanding stability, increases resistance to flash over and creepage. In temperature extremes, from  $-67^{\circ}\text{F.}$  to  $+275^{\circ}\text{F.}$  performance is remarkable. Dielectric strength is never less than 300 volts per mil. If you want more for your money in electrical connectors, be sure to specify Bendix Scinflex. Our sales department will be glad to furnish complete information on request.



#### PLUS



##### SHELL

High strength aluminum alloy  
... High resistance to corrosion ... with surface finish.

##### CONTACTS

High current capacity ... Low voltage drop.

##### SCINFLEX ONE-PIECE INSERT

High dielectric strength ... High insulation resistance.

*Bendix*

**SCINTILLA MAGNETO DIVISION of**

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200 North Street, San Francisco 4, California

# NEW PRODUCTS

(Continued from page 64)

yet made of high quality bearing steel with its advantages of hardness and finish.

The new R. F. Series of sealed bearings is made in high precision quality

and is available immediately in bore sizes from 3 mm (0.1181 in.) to 8 mm (0.3150 in.) and corresponding outside diams of 10 mm (0.3934 in.) to 22 mm (0.8661 in.). Two smaller sizes with OD of 0.2362 and 0.3150 will be available shortly.

## BALLS FOR BEARINGS AND OTHER BALL APPLICATIONS

Precision balls made for your job — available in a variety of materials. Your specifications will receive prompt attention in our Engineering Department. We are thoroughly experienced in supplying the automotive industry with special bearings, retainers and balls. Let us give you our recommendations.

### THE HARTFORD STEEL BALL CO. HARTFORD 6, CONN.

DETROIT W. S. TORRER 445 NEW CENTER BLVD.	CHICAGO VICTOR W. CLARK 603 W. WASHINGTON BLVD.	NEWARK, N. J. GUARANTEE TRUST BLDG. 1072 RADAR ST.	LOS ANGELES, CAL. J. B. WALTON CO. 1710 SOUTH FLOWER ST.	EXPORT R. A. RODRIGUEZ, INC. 55 W. 47th ST., NEW YORK
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For additional information regarding any of these items, please use coupon on page 56

## C-41—Plastic Coated Felt Floor Carpeting

Floor carpeting for the interiors of cars, made of a plastic coated jute felt, is available from Burlington Mills, Inc., Burlington, Wis. Called Burtex 180-634, it is notable in employing no critical materials, such as rubber, in its construction. The amount of plastic applied on the surface coating can be varied to meet specification as to abrasion resistance, economy, appearance, etc. The felt base is declared to contain more fibres by weight than the usual undermat felt used in automobiles. It is declared a firm felt due to the pressing action entailed when the material is embossed, with a simulated carpet grain.

The felt can be made mildew- and vermin-proof.

## C-42—Plating Process and Plating Unit

Model A-20 Chromaster plating unit, placed on the market by Ward Leonard Electric Co., Mt. Vernon, N. Y., provides production industries with complete facilities for hard chrome plating metal surfaces up to 10 sq. in. at the recommended current density of 2 amps per sq. in. Unit is compact and completely portable. Powered by a dry disk power pack selenium rectifier, the unit comprises plating bath tank, heavy duty rheostat, timer, ammeter



Ward Leonard chrome plating unit, Chromaster Model A-20.

and reversing switch for stripping action. The hard chrome deposition can be controlled to tolerances of less than 0.0001 in.

Operating at room temperature, Chromasol, a new, non-critical chrome plating solution shipped to the user in a liquid, concentrated form, delivers a hard chrome plate that follows the exact characteristics of the base metal to which it is applied. The rate of deposition remains constant at 0.002 in. per hr.

Using this unit and process, 1½ minutes is said to be the average time required to hard chrome cutting tools and wear parts and fortify them (Turn to page 98, please)

Dash Insulation Pad  
Bur-Tex No. 188  
Plastic Covered 1/4" Poly-Felt

Dash Insulation Top Pad  
for Panel  
Bur-Tex No. 181—3/32"  
Weathered on  
No. 188 Poly-Felt

Bur-Tex No. 116  
Acoustics Insulation  
Plastic Felt

Bur-Tex No. 190  
Dash Insulation  
Felt  
Weathered Surface

**Bur-Tex**

## Searching for a reliable supplier of noncritical material for TRUCK INSULATION and TRIM?

The items illustrated . . . and many other similar items are currently being made by us of noncritical materials for leading truck manufacturers.

If you need vibration deadener materials, headlinings, floor mats, heelboard panel insulation, seat back coverings, or other long wearing interior trim, consult Burlington Mills now.

Let us help engineer your trim or insulation problems — where critical materials may be involved.

**BURLINGTON MILLS  
INCORPORATED**

BURLINGTON • WISCONSIN

Detroit Office:  
504 Stephenson Bldg., TRinity 3-0762

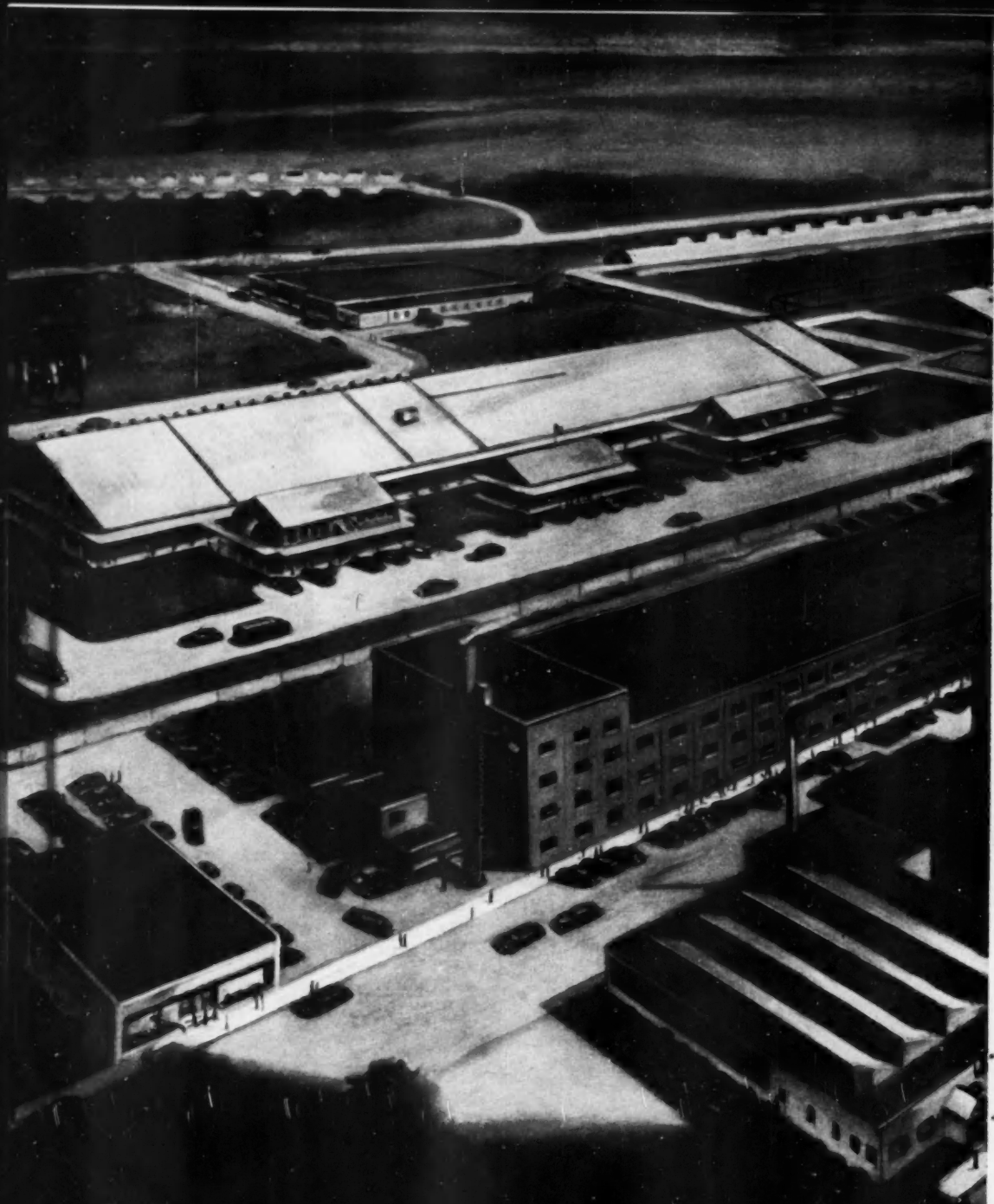
Bur-Tex No. 151  
1/16" Gasket Felt

Gasket Cover  
Plate Sealing  
Collar and  
Pedal Covering

Gasket

Gasket Seal  
Brake Cylinder  
Insulation

Bur-Tex No. 153—1/16"  
Sprink Guard Felt

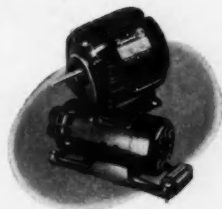


*Redmond*





# "THE BIG NAME IN SMALL MOTORS"



**and Manufacturers of  
Special Equipment for  
Defense Requirements**

The multi-plant operations of the dynamic Redmond organization — in Michigan, Arkansas and Canada—serve you just as though they were the electric motor division of your own organization.

Every year these efficient plants turn out millions of low-range fractional horsepower Redmond Micromotors, in sizes up to 1/10th horsepower, and blowers up to 220 cubic feet per minute output.

For defense requirements, too, Redmond is again ready with the experience to engineer and mass produce precision dynamotors and a variety of other equipment.

When you need quality in quantity, call first on Redmond, the BIG name in Small Motors.

**REDMOND COMPANY, INC., Owosso, Mich., U.S.A.**  
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# MICROMOTORS

# Advanced Production Methods

(Continued from page 32)

The authors conclude that the machinability of medium carbon alloy steels is likewise a function of their microstructure. Experimental data on the turning of SAE 8610 steel, heat treated in various ways, indicates that machinability is dependent upon the resulting structure as well as the selection of the cutting tools. Since the structure varies with the selection of the annealing cycle, it seems essential to determine the unique heat treating procedure in each case so as to develop

optimum machinability. The authors demonstrate that large improvements in production rates and tool life can result from the correct microstructure and the selection of a compatible tool material.

Mass Production Lapping Techniques, by C. R. Moore, Chevrolet—The Powerglide transmission is an excellent example of the exceptionally fine tolerances and precision work impressed upon mass produced automotive parts. For one thing, this unit has in-

ternal oil pressures as high as 180 psi with temperatures up to 300 F at which point, the viscosity is extremely low. Despite the use of special gaskets at most mating surface, it is necessary to have a high degree of flatness in all mating surfaces to prevent internal and external leaks.

Some impression of the actual requirements may be gained from the following sampling. The cover plates for the two oil pumps must be flat and parallel within very close limits to insure proper alignment and oil-tightness. Oil pump gears are lapped to a tolerance of 0.0003 in. for thickness and 0.0001 in. for parallelism to assure an axial operating clearance of 0.0005-0.0007 in., with a minimum of selective assembly.

Lapping also aids in establishing a perfectly flat locating surface for manufacturing purposes in preparation for precision-boring operations on the valve body and oil pump. In addition to many flat surfaces, there are certain cylindrical surfaces as well as bores which require exceptional surface finish in the interest of durability.

One of the major contributions to manufacturing made by Chevrolet is in the exploitation of the high production, automatic machine method of lapping.

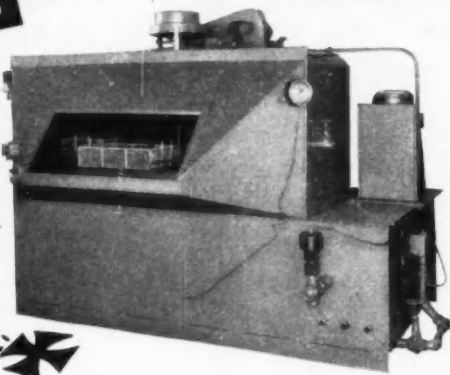
Mass Marquenching, by W. B. Cheney and W. C. Hiatt, International Harvester Co.—Marquenching is a coined word for a process employing a form of interrupted quench. Since oil is used as a quenching medium at 400 F, the temperature is not adjusted to the M. point for the types of steels used in the plant. At the present time the Fort Wayne Works is Marquenching about 75 different parts ranging in weight from ½ to 12 lb, with solid sections ranging from ½ to 2½ in. These parts include transmission gears, differential side gears, side pinion gears, king pins, and miscellaneous shafts.

It has been found that Marquenching produces gears with a minimum of residual stress. This has been instrumental in increasing durability from 160 to 200 per cent; and increasing load-carrying capacity from 15 to 20 per cent, as determined by dynamometer testing.

To achieve these results, it is necessary to control a wide variety of variables, including—furnace temperature, carbon concentration, speed of quench and quench time. With these controls they obtain a fine martensitic case structure which is responsible for an exceptional improvement in physical properties.

The work is done in a group of five Radiant Tube Gas Carburizers, of two-row continuous type containing 21 trays per row, on which the work is automatically charged. Furnace atmosphere consists of RX gas as a car-

## ONE MAN OPERATION with **BLAKESLEE** METAL PARTS WASHERS



**BLAKESLEE  
SOLVENT VAPOR  
DEGREASERS**

—economical, efficient—  
USE LESS SOLVENT

**BLACOSOLV**

Stabilized Degreasing  
Solvent — one price,  
one solvent for all metals

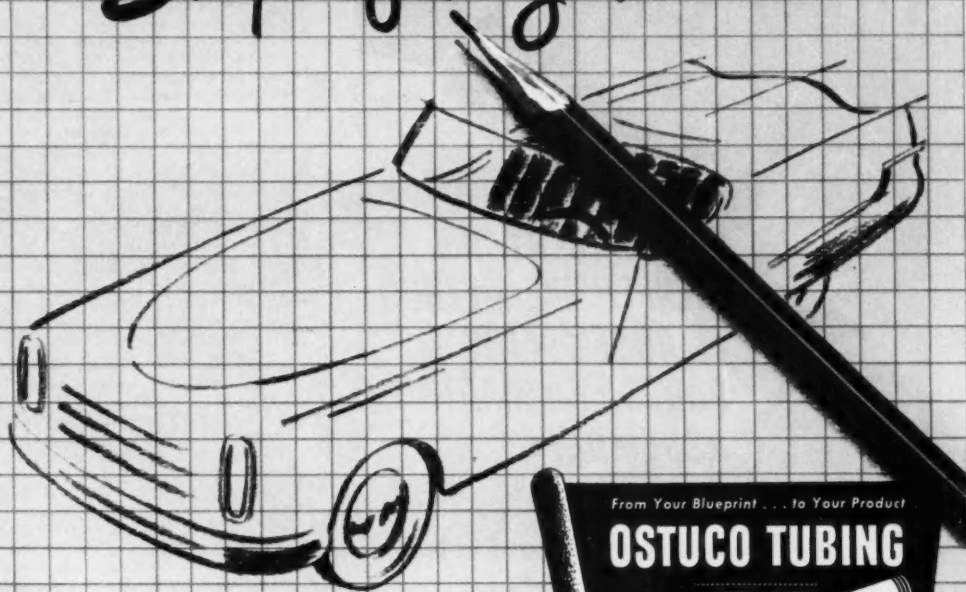
### Blakeslee's new washer saves labor, is economical

Just one man can keep the production line going with this time saving metal parts washer. Turn table operation permits loading and unloading in one easy pivot movement. One revolution of the washer turn table and parts come out sparkling clean for a better finishing job with fewer rejects. Blakeslee washers are designed for every type and size of plant operation. Write for the cooperative services of our engineer-trained sales representatives.

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Whether your products are automotive or in some entirely different field, you doubtless are doing some long-range planning . . . looking beyond the immediate future to the time when increasing production for civilian use will again demand emphasis on advanced design.

In exploring the possibilities for the future, it will pay you to consider the many advantages of OSTUCO Steel Tubing. Hundreds of product engineers and manufacturers have found that no

other material offers so many outstanding opportunities for improving design, increasing strength, reducing weight, enhancing beauty, and cutting cost.

Because of the growing needs of our armed forces, we cannot promise early delivery on new civilian orders, but we do wish to help you take advantage of OSTUCO Tubing in your plans for the future. Please feel free to call or our experienced tubing engineers for advice and information at any time.

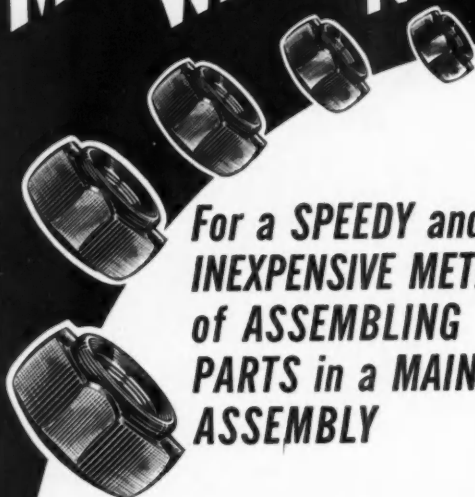
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# MIDLAND WELDING NUTS



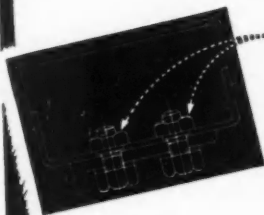
**For a SPEEDY and  
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Solves production problems created by hard-to-get-at places.

Rapid assembly and accuracy assured because the Midland Welding Nut is self locating.

Simplifies stampings because no depression or pocket is required for head or clinching.

Reduces inventory—standard welding nut can be used on a wide variety of metal thicknesses.



## A Typical Use For MIDLAND WELDING NUTS

The Midland Nut, welded to concealed part, or "blind spot," permits a bolt to be turned into it without any device to hold the nut from turning.

In similar cases the Midland Welding Nut will help you speed production and lower costs. Write or phone for complete information.

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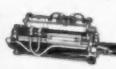
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DOOR CONTROLS



rier and 1050 Btu natural gas as an activator. One important result of close control is an increase in the life of alloy trays which, although of light design, have a life in excess of 8000 hours.

Due to differing requirements of case depth, the furnaces are operated in cycles according to one of the following three case depths: 0.025-0.035; 0.031-0.047; 0.047-0.063 in. Studies of carbon concentration compatible with the requirements of hardness and structure have made it possible to limit carbon to a range between 0.85 and 0.95 per cent, compared with the former practice of 1.10 to 1.20 per cent.

The quench tank is of 1600 gal capacity, located directly under the side discharge door, permitting the material discharged to the lowerator to be submerged in the heated oil bath. The tank is so designed that the flow of oil is greatest at the submerged work level. Oil bath temperature is held at 400 plus or minus 2F by six radiant tubes, thermostatically controlled.

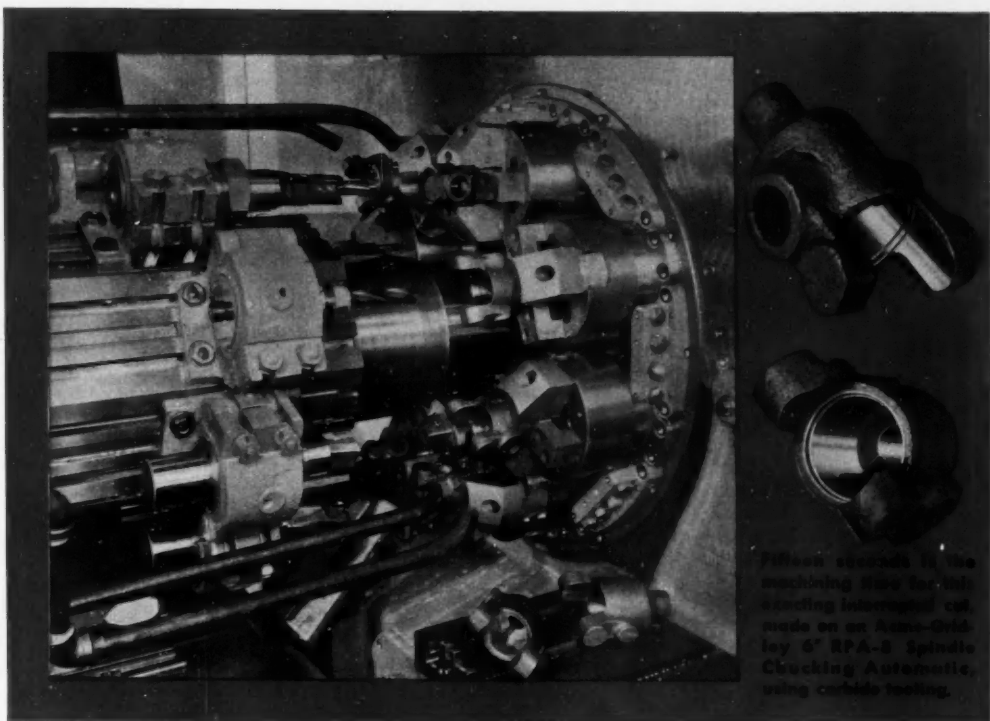
Developments in Large Closed Die Forging, by E. O. Dixon, Ladish Co.—The current work at Ladish is being conducted with an enormous "counter-blow" type hammer developed by the Germans and having the equivalent forging performance of a conventional hammer of around 100,000 lb rating. Forging capacity of this hammer may be visualized from the fact that it has been employed to produce totally enclosed die countour forgings weighing over 8000 lb each. Die blocks required for this work weigh about 50,000 lb each.

Many new problems were encountered in producing these large closed-die forgings. Mostly they involved the solution of operations quite beyond the range of forge shop equipment even in a large forging establishment. For example, forging billets weighing upwards of 12,000 lb made it necessary to develop a specially built floor type manipulator for charging furnaces, serving the hammer, transferring forgings from the hammer to the trim press, and from the trip press to the factory buggy. It has a capacity of 12,000 lb and an outboard sweep of 10 feet.

Trimming of flash was another problem, requiring handling in a 3000-ton hydraulic press. Because of the size of the work the conventional order of press and trimming dies was reversed to provide greater ease in locating knock-out cylinders and removal of the forging.

Among other developments pointed out is the successful extrusion of large tubular projections from larger bodies of metal formed in closed dies. One example shown by the author is an airplane landing gear cylinder extruded from a hinged end section, yielding substantial savings in metal and machining.

AUTOMOTIVE INDUSTRIES, February 1, 1951



Follow through in the machining time for this exciting interrupted cut made on an Acme-Gridley 6' RPA-8 Spindle Chucking Automatic, using carbide tooling.

## HOLD HIGH CONCENTRICITY on high-speed interrupted cuts ...put the job on an Acme-Gridley Automatic

Here's more proof that an Acme-Gridley's basic design advantages pay off in the ability to take it—on the toughest kind of tricky jobs—up to the limitations of modern carbide tooling speeds.

To take interrupted cuts at high speed and still maintain concentricity, an automatic must have rigid, rugged strength in the frame; *an Acme-Gridley's got it.* And direct, positive camming keeps accuracy always up to snuff.

Adaptability is another important advantage of Acme-Gridleys; they'll handle a wide variety of tooling (including independent power-driven auxiliaries where needed). That way, better distribution of cuts or the combining of operations can cut machining and handling times.

All these features add up to give you "more good

pieces in the pan," more tough production problems licked. Get the full story on these time-saving, money-saving Acme-Gridley 4, 6 and 8 spindle Chucking Automatics—ask for Bulletin CM 51.

### JOB FACTS

**PART**—Hydraulic Lift Box

**MATERIAL**—1035 Steel Casting

**MACHINE**—Acme-Gridley 6' RPA-8 Spindle Chucking Automatic

**TOOLING**—Carbide

**TOLERANCES**—.003" on Large Hole; .001" on Small Hole

**MACHINING TIME**—15 Seconds (240/hr.)

*Machine Obsolescence is the Creeping Paralysis That Strangles Profit.*

# The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics:  
1-4-6 and 8 Spindle • Hydraulic Thread  
Rolling Machines • Automatic Threading Dies  
and Taps • The Chronolog-Limit, Motor Starter  
and Control Station Switches • Solenoids  
Centrifuges • Contract Manufacturing



# Chrysler for 1951

(Continued from page 43)

on New Yorker and other Imperial models.

Although the conventional steering linkage is retained, the overall ratio in terms of the number of steering wheel turns required for complete travel has been reduced from 5½ to 3½. Since the steering effort with the hydraulic gear is about one-tenth of that required for conventional manual operation, the manual effort now required is about one-fifth of conventional.

Forced air cooling has been adopted in conjunction with the disk brakes installed on Imperial eight-passenger sedan and limousine only. Said to reduce internal brake temperatures up to 35 per cent, this results in reducing brake lining wear as much as 50 per cent, permitting high speed stops with greater effectiveness because of improved fade characteristics.

Air cooling is effected by the introduction of a one-piece steel impeller retainer containing 20 blades. The wheel

cover is crimped onto the periphery of the retainer, the latter being attached to the wheel disk by means of conventional spring clips. A gap between the edge of the wheel cover-retainer combination and the wheel rim together with 12, D-shaped punched openings in the wheel disk provides the air passage.

The new all-electric gear box window lift mechanism, described in AUTOMOTIVE INDUSTRIES some time ago, is standard equipment on Imperial models; and offered as special equipment on other models.

Increased capacity to handle the electrical power load is effected by an increase of five-amp in generator output.

Strength and quietness in front end sheet metal have been improved by means of a structural arrangement forming a yoke connecting the front fenders. This member, in turn, is fastened to the radiator support with rubber washers at attachment points to the frame.

Rubber-insulated mountings are used at No. 1 body brackets to insulate the body from the frame. Easier servicing of fuel gas tank units is afforded by a one-piece rubber inspection hole cover.

## Rear Axle for Short Tractors

(Continued from page 41)

Application of the R-330 series rear axle is limited to tractor use where the maximum axle load on the tires at the ground will not exceed 18,000 lb—the rated capacity of four 11:00 x 20 tires.

In highway hauling units every ounce of weight is a factor to be considered. The design of top mounting used in the R-330 series rear axle and the limitation to highway tractor use makes practical the use of a forged steel axle housing, resulting in a considerable weight saving. In addition, aluminum hubs for disk wheels can be supplied resulting in a weight saving of another 75 lb.

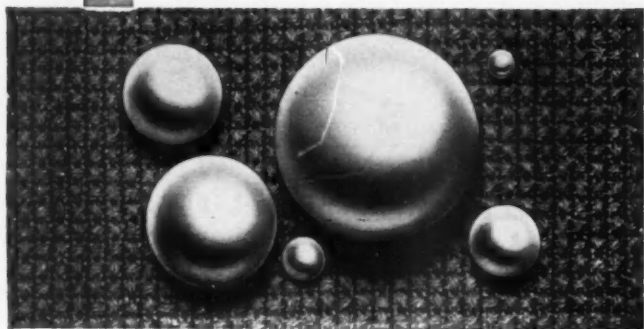
Heavy-duty Timken-Detroit DP dual primary brakes with either compressed air or hydraulic actuation or Timken-Detroit P Series power brakes are available to meet any owner preference. Cast alloy iron brake drums are supplied.

For further weight saving, aluminum brake shoes for P Series brakes are available which save 35 lb as compared with the conventional cast iron brake shoes.

Power shifting of axle gears can be by any one of three types of power actuation—compressed air, vacuum or electric motor.

IN

size and spherical accuracy  
perfection of surface  
uniformity—dependable physical quality



## NOT A BETTER BALL MADE . . .

And the service results from every Strom metal ball prove it—not only in the finest precision ball bearings but also in the lot of other ball applications where Strom balls are doing the job better.

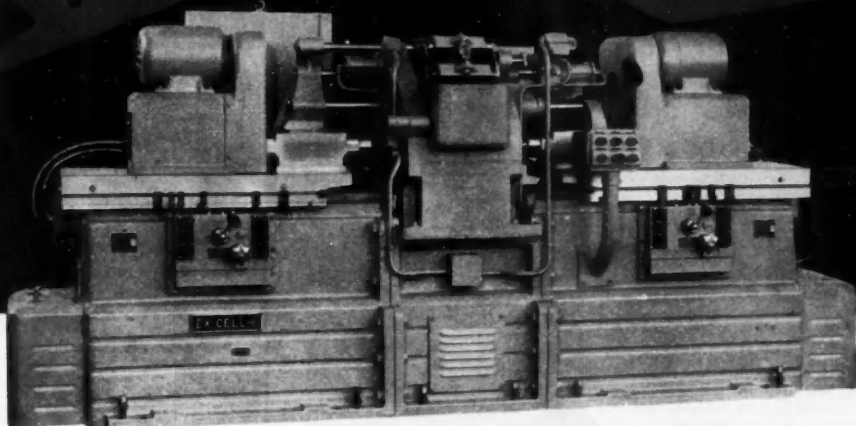
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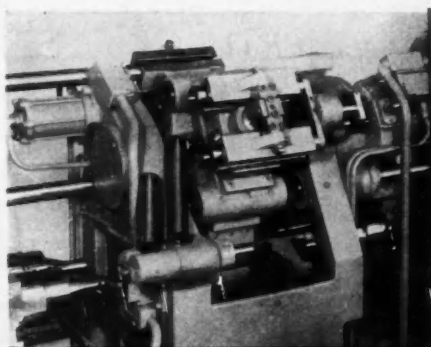
FOR  
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**EX-CELL-O TWO-WAY MACHINE BORES, CHAMFERS, AND FACES BOTH ENDS OF TUBULAR STEEL PARTS AT NET RATE OF 366 PIECES PER HOUR!**

Ex-Cell-O Way Type Precision Boring Machines save time by machining parts from two or more directions at the same time. And relationship of the various operations to one another is exact because the accuracy is built into the machine—it does not depend on the accuracy of repeated locating and clamping.

The machine illustrated here has a trunnion type indexing fixture, machines both ends of two parts per cycle, ejects the finished work automatically. Have your Ex-Cell-O representative explain all the advantages of these machines to you, or write today to Ex-Cell-O in Detroit for further information.



*View of the three-station indexing fixture. Parts are loaded in upper station, machined in lower station, automatically exchanged and ejected from lower station.*

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MANUFACTURERS OF PRECISION MACHINE TOOLS - CUTTING TOOLS - RAILROAD PINS AND BUSHINGS  
DRILL JIG BUSHINGS - AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS - DAIRY EQUIPMENT

## Gemmer Hydroguide

(Continued from page 51)

controlled manually in the event of hydraulic system failure or an inoperative engine. It is claimed that nothing in the hydraulic circuit can possibly prevent operation in the event of failure. Naturally under these conditions steering will require more effort.

As mentioned earlier, only a slight displacement of the valve operating block is required to place the valves in operation for controlling the hydraulic circuit. By proper proportioning of

valve areas with respect to the area of the main pistons, the steering effort at the wheel can be made quite light.

Another important feature of the Gemmer gear is that steering gear stops for maximum travel are provided within the gear box, making external axle stops unnecessary.

The entire oil system is self-contained, completely closed and has a capacity of three pints of 10W engine oil.

## Highest Precision HARDENED & GROUND PARTS

**T**HE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud has to be right—every feature is. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

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anything in the  
hardened and ground  
line, of any analysis  
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## Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for  
AUTOMOTIVE INDUSTRIES.

General business activity early in January continued at a level substantially above that of a year ago. Increases during this period were reported in department store sales, construction, electric power output, railway freight loadings, and crude oil production. For the week ended Jan. 6 the New York Times index of activity stands at 171.2, as compared with 169.1 in the preceding week and 150.0 a year ago.

The dollar value of department store sales in the week ended Jan. 6, as reported by the Federal Reserve Board, was equal to 285 per cent of the 1935-39 average, as compared with 237 in the week before. At this level, the value of sales was 35 per cent above that for the comparable week of the preceding year. The total reported for 1950 was five per cent more than the corresponding sum in 1949.

Production of bituminous coal and lignite in the week ended Dec. 30 is estimated at 9.1 million net tons, 1,925,000 less than output in the week before, but 2,462,000 more than the comparable amount a year earlier.

Civil engineering construction volume reported for the five-day week ended Jan. 11, according to *Engineering News-Record*, was \$415.8 million, as compared with \$154.2 million in the preceding week. The total recorded since the beginning of 1951, at \$1570 million, is 10 per cent more than that in the corresponding period of 1950.

Production of electric power rose moderately during the week ended Jan. 6. At 6602 million kilowatt-hours, total output was 15.9 per cent above the amount a year earlier, as compared with an advance of 18.0 per cent shown in the preceding week.

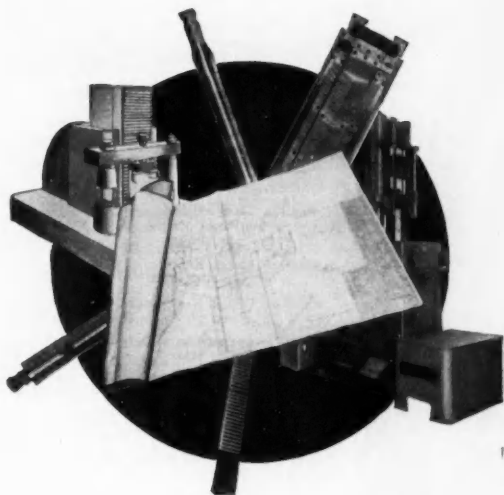
Railway freight loadings in the week ended Jan. 6 totaled 662,444 cars, 10 per cent more than the figure for the week before and 31 per cent more than the corresponding number last year.

Crude oil output in the week ended Jan. 7 averaged 5,787,810 barrels daily, 19,900 more than in the preceding week and 861,110 above production for the similar period in 1950.

The wholesale price index of the Bureau of Labor Statistics for the week ended Jan. 9, at the new record level of 177.9 per cent of the 1926 average, was 2.5 per cent higher than four weeks ago and 17.2 per cent above the comparable figure for 1950.

Member-bank reserve balances decreased \$189 million during the week ended Jan. 10. Underlying changes thus reflected include decreases of \$644 million in Reserve-bank credit, \$270 million in money in circulation, and \$160 million in the monetary gold stock. Other decreases include \$273 million in Treasury deposits with Reserve banks, and \$84 million in foreign deposits with Federal Reserve banks. An increase of \$9 million in Treasury cash was reported.

Total loans and investments of reporting member banks decreased \$182 million during the week ended Jan. 3. An advance of \$20 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at \$17,859 million, were \$409 million more than the comparable sum a year earlier.



## “Endorsed Broaching”

### Are you using this free COLONIAL service?

One of the *troubles* with broaching is that the process is so fast and accurate that it is easy to be satisfied with the *initial* results obtained with almost any broaching installation.

Yet, time and again, Colonial Broach engineers have studied new or proposed broaching setups and pointed out where a different type of broach, machine or fixture would greatly improve the operation either as to productivity, product quality, or cost per piece—frequently all three.

Since broaching equipment is inherently expensive as to *first* cost, it is darn good protection to have an installation checked over by Colonial's broaching specialists before broaching equipment or tooling is ordered.

Once you have the equipment, *any* change usually means *increased* investment where previously it might have meant *less*.

And Colonial's "broaching protection" costs you nothing.

#### For Your Tool Room

A wall or bulletin board poster of DO and DON'T items that should help you reduce broach maintenance cost. No charge. Ask for BN-1250.





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We've been diagnosing spring problems for 61 years and industry has thrived on our prescriptions. Recommending the right springs for people like yourself is an old habit with American-Fort Pitt engineers.

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**AMERICAN-FORT PITT  
SPRINGS**

## CALENDAR

OF COMING SHOWS AND MEETINGS

### Conventions and Meetings

- Nat'l Auto. Accessory Mfrs. Assoc., New York ..... Feb. 5-8
- Los Angeles Motor Car Dealer Assn., 29th Automobile Show, Los Angeles ..... Feb. 16-26
- SAE Passenger Car Body & Materials Mtg., Detroit ..... Mar. 6-8
- International Auto Salon, Geneva, Switzerland ..... Mar. 8-18
- Amer. Soc. Tool Engrs., New York City ..... Mar. 17
- Western Metal Exposition and Congress, Oakland, Calif. .... Mar. 19-23
- Pacific Automotive Show, Seattle ..... Mar. 21-24
- Salone Internazionale Dell'Automobile, Turin, Italy ..... Apr. 4-15
- British Automobile and Motor Cycle Show, New York City ..... Apr. 15-23
- Amer. Soc. Lubricating Engrs., Phila. .... Apr. 16-18
- SAE National Aeronautic and Aircraft Engine Display, Hotel Statler, N.Y.C. .... Apr. 16-18
- Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic City ..... Apr. 17-20
- 1951 Metal Powder Show and 7th Annual Meeting of Metal Powder Assn., Cleveland, Ohio .... Apr. 25-26
- Chamber of Commerce Annual Mtg., Washington, D. C. .... Apr. 30-May 2
- Materials Handling Conference, Chicago ..... Apr. 30-May 4
- A.E.R.A. Convention, Chicago .... May 7-9
- Nat'l Air Races, Cleveland Airport ..... May 19-20
- Amer. Society for Quality Control, Cleveland ..... May 23-24
- SAE National Summer Meeting, French Lick, Ind. .... June 3-8
- Third World Petroleum Congress, The Hague, Scheveningen, Holland ..... May 28-June 6
- American Gear Manufacturers Assn. (Annual Meeting), Hot Springs, Va. .... June 4-6
- American Society of Mechanical Engineers semi-annual meeting, Toronto, Canada ..... June 11-15
- American Society for Testing Mat's Annual Meeting, Atlantic City, N. J. .... June 18-22
- SAE National West Coast Meeting, Seattle, Wash. .... Aug. 13-15
- First European Machine Tool Exhibition, Paris ..... Sept. 1-10
- Sixth National Instrument Conference and Exhibit, Houston, Texas ..... Sept. 10-14
- American Society of Mechanical Engineers (fall meeting), Minneapolis, Minn. .... Sept. 25-28
- Nat'l Metal Trades Assn., Chicago, Ill. .... Sept. 26-28



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You can locate . . . position . . . and hold . . . production work better with Bunell Custom Built Jigs and Fixtures. These special fixtures reduce handling time — assure accurate positioning and clamping — perform a number of operations at once.

Bunell Custom Built Jigs and Fixtures are especially designed for fast, efficient handling of parts for volume production at lower cost. We've built hundreds of fixtures of all sizes for every conceivable purpose. We have complete plant facilities especially suited for extremely accurate work on large size fixtures.

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Since 1920, Designers and Builders of Special Tools, Dies, Jigs, Fixtures and Special Machines

# Impact of Rearmament Program

(Continued from page 36)

tion. Fig. 2 shows the fuel flow in gallons per hour of a Minneapolis-Moline Model U tractor as taken from Nebraska test Nos. 319 and 411. Test No. 411 was made with all power consuming accessories included on the tractor, whereas Test 319 was tested without a number of these accessories. In order that we make a fair comparison between the two tractors burning different fuels, we have made a slight correction in the gasoline power output to com-

pensate for these devices. It is of interest to note that fuel consumption difference tends to become smaller at the lighter loads, and favors the LP gas slightly at the low end. The LP gas used in this test was propane.

Cold room tests conducted on the same engine when equipped with gasoline or LP gas have indicated that the gasoline engine will start if it is to start at all many times easier than that of LP gas. Several tests have been

conducted to improve the starting characteristics of the LP gas engine. So far as has been determined, the hot temperature treatment to the water jacket seems to be the most successful. Ways and means of heating the incoming fuel or the air do not produce any improvement. Some tests were conducted with Diesel starting devices, such as the ether manifold injectors and have found it to be helpful in starting LP gas engines under subzero temperature conditions. The starting problems will not be minimized as the

for over

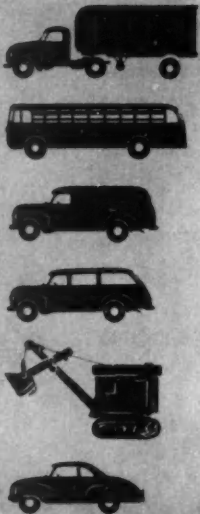
# 70

YEARS

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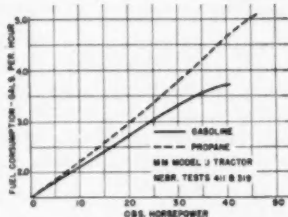


Fig. 2—Fuel flow gph of a Minneapolis-Moline Model U Tractor.

engine compression ratios are increased. This is a problem the engineers must face in application of LP gas to agricultural tractors. Farmers are more and more coming to use their tractors 12 months out of the year. The application of LP gas to farm tractors is increasing at a rapid rate, and as long as the price differential exists, it makes this fuel attractive to the farm operators. Inasmuch as the farmer is encouraged to use this fuel for his other operations on the farm as well as to heat his house, heat his bath water, and cook his food, we can expect increasing interest in the application of this fuel for farm tractor power. In spite of the problems that will be incurred in its use, tractor manufacturers will be called upon to supply equipment to satisfactorily use this fuel.

### The Role of Gasoline in Engine Development

By D. P. Barnard

Research Coordinator,  
Standard Oil Co. (Ind.)

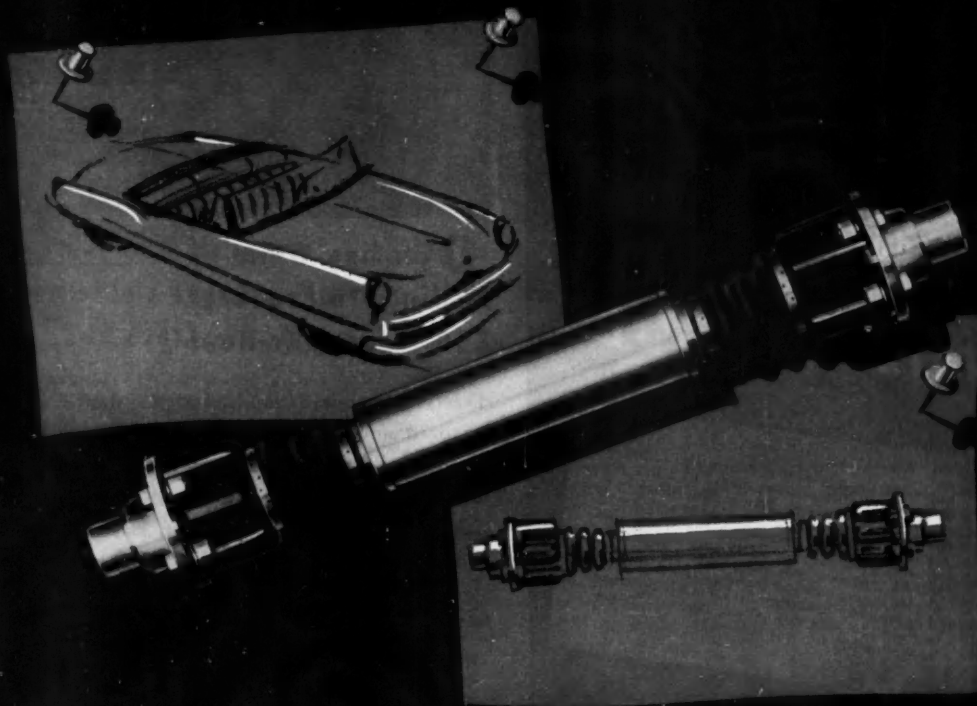
HESELBERG and Lovell have developed the relation between basic hydrocarbon characteristics and fuel performance in a most forceful and informative manner. They show that if the engine is of appropriate design, a performance increase of the order of 40 per cent can be achieved with, say, four ml of tetraethyl lead per gallon, even at very high performance levels.

(Turn to page 91, please)

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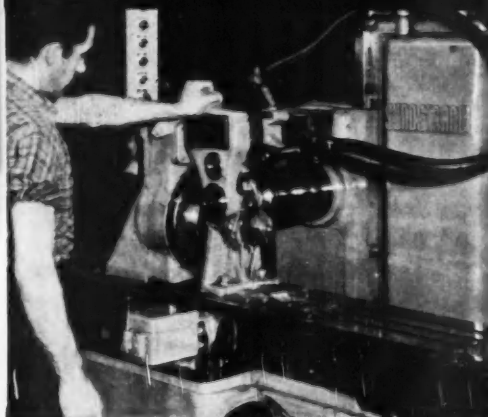
**JOINTS**



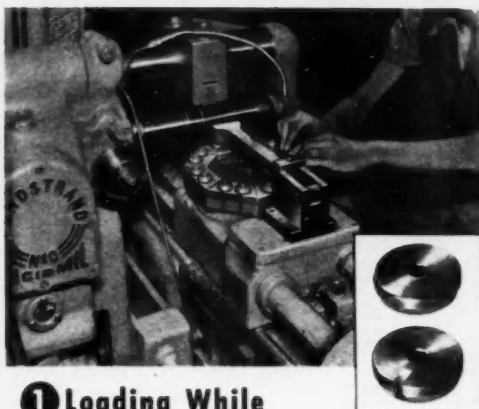
UNIVERSAL PRODUCTS COMPANY, Inc., Dearborn, Michigan

# How **SUNDSTRAND** "Engineered Production" Plus Automatic In- dexing Increases Production On **MILLING JOBS**

There are countless cases where the addition of a relatively simple attachment to a milling machine will increase production sufficiently to eliminate the need for purchase of additional machinery. This is often true with the addition of Sundstrand automatic indexing equipment. Milling problem solutions, like the five examples shown here, are the result of Sundstrand "Engineered Production". Call in a Sundstrand engineer on your milling problems. There is no obligation for this service.



**RIGIDMILS • FLUID-SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT**

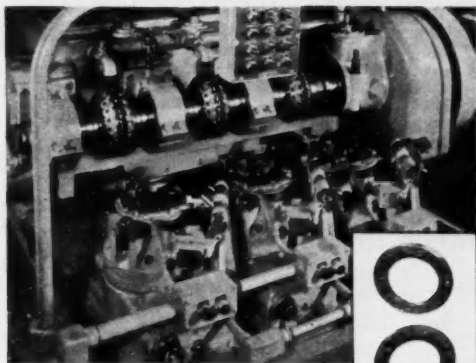


## ① Loading While Milling, to Produce 800 Pieces Per Hour

This is a standard Sundstrand Rigidmil with standard automatic index base. The index base has 8 work-holding stations with 2 parts held in each station. Parts are located on pins and clamped and unclamped automatically with the movement of the machine table. As idle machine time for loading is eliminated, production rate of 800 pieces per hour can be obtained.

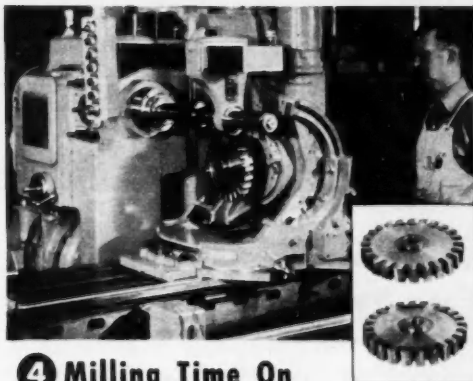
## ② Milling Multiple Surfaces With One Loading of Part . . . . Production Increased 22.5 Times

Here's a good example of the production possibilities available from an automatic indexing base and a standard machine. Milling time was cut from 3 hours per cylinder sleeve to 7.5 pieces per hour. This increased production is due largely to the use of a standard automatic index base in conjunction with a standard vertical feed attachment. These attachments provide a complete automatic cycle for milling 12 grooves in each cylinder sleeve.



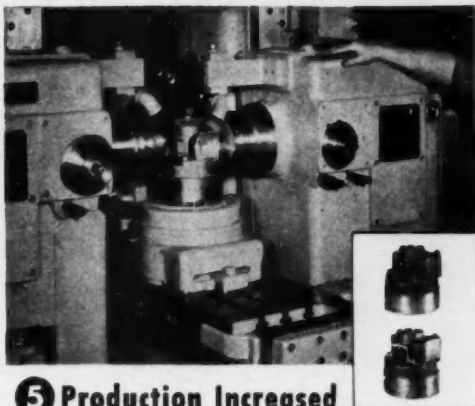
### ③ Straddle Milling 3 Clutch Plate Lugs Per Machine Cycle ... 240 Plates Per Hour

This is a special Sundstrand Rigidmil with 3 automatic index bases. The machine has a traveling head with a single spindle driving 3 sets of cutters on an arbor. The head cycle and indexing fixtures are timed so that each indexing fixture rotates 120° as the head rapid returns from a cut. One part with three lugs, straddle milled and slotted is completed each machine cycle.



### ④ Milling Time On Cutter Bodies Cut 46%

This standard Rigidmil has a vertical power attachment for positioning the head and a universal type indexing fixture for milling tooth slots and chip clearance in cutter bodies. Fixture can be set 45° to the right or left of the horizontal center line and up to 10° past the vertical center line or a total of 100° movement. Pieces range from 4" to 14" diameter and lot sizes from one to eleven.



### ⑤ Production Increased From 30 To 67 Pieces Per Hour With Duplex Mill And Automatic Index Base

Four surfaces of the cast iron compressor block shown are milled on a standard Model 22 Sundstrand Rigidmil. This machine is of the duplex type and provided with a Sundstrand standard Automatic Index Base attachment. In using the duplex type machine and providing an automatic indexing cycle, all four sides are machined in two passes of the table and one handling of the part. This results in greater accuracy and eliminates spoilage.

Production of this machine is more than double that of the unit replaced. It produces 67 pieces per hour at 85% efficiency. The old milling setup turned out 30 pieces per hour.

### FREE Additional Data

For more information on Sundstrand "Engineered Production" on milling jobs, write for these booklets. Ask for bulletins 204.



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## For Dependability, Airplanes Rely on Hydraulic Controls

### *Hydro-Lectric System Brings this Performance to Car Window Operation*

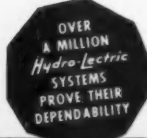
Experiences during the last world war convinced the airplane industry that hydraulic controls are required wherever dependability is a "must."

Automotive engineers have known this for many years. That's why they developed hydraulic brakes. And that's why they prefer Hydro-Lectric automatic window operating mechanisms.

The Hydro-Lectric system, utilizing hydraulic power,

is simple and compact. It requires only *one* power unit, which is located away from moisture-laden areas in a protected spot under the hood. No complicated linkage or gearing is needed. Action is always positive and maximum power is exerted at all times.

The Hydro-Lectric system—developed by Detroit Harvester—has been selected by leading motor car manufacturers for over eleven years.



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Further, that the hydrocarbons giving the highest performance are of the "sensitive" type, including triptane, cyclopentane, di-isobutylene, and toluene. The hydrocarbons which are insensitive to engine characteristics do not even approach the necessary performance possibilities.

The paraffins of which most straight-run gasolines are composed are notoriously low in octane number. The highest-octane iso-paraffins must be made synthetically—the best of them are quite sensitive—and the costs of making them in large quantities are inherently high. The light cyclo-paraffins cannot be synthesized in large quantities by any process now in sight. The mono-olefins (and certain di-olefins) are produced on a very large scale by cracking. They have proved to be excellent motor fuels, and have good octane number in most engines. The conjugated polyolefins and the acetylenes are quite unsuited chemically for consideration as motor fuel components. This leaves the aromatics as the chief class of hydrocarbons on which to focus future process development.

The group of aromatic hydrocarbons suitable for inclusion in motor gasoline is somewhat limited. It includes benzene, toluene, the xylenes, and a few of the heavier aromatics. Gasoline made by catalytic cracking contains more of such hydrocarbons than does thermally cracked gasoline, and the various catalytic reforming processes can be used to increase them still further. Catalytic reforming or, more accurately "catalytic dehydrogenation," works best on the lighter fractions and on charging stocks containing comparatively high proportions of cycloparaffins, such as cyclohexane and heavier. Platforming and even more recent other catalytic reforming processes offer real operating advantages but essentially duplicate the product composition of older catalytic reforming procedures.

The petroleum industry has devoted the last 40 years to diligent research and process development aimed at meeting quantity requirements and improving gasoline quality, and it can be expected to continue and even increase these efforts. However, it is only fair to point out that further improvements seem certain to be slow and expensive, and that they may soon reach an economic limit so far as motor car use is concerned. Aviation use can, of course, justify much higher costs. This growing need may "skim much of the cream" off the gasoline barrel as it continues to demand the best and even still better components.

### Motor Fuel Volatility Trends

By W. M. Holaday and D. P. Heath  
Socony-Vacuum Laboratories

IN contrast to motor gasoline anti-knock quality, relatively little publicity has been given in recent years to fuel volatility. However, changes in motor gasoline volatility may be ex-

pected as a result of two principal forces—one, the trend in refinery processing toward rapidly increasing utilization of catalytic cracking and catalytic reforming operations, and two, the drive toward more efficient utilization of the potential energy in the nation's petroleum resources.

Although volatility is related to many performance factors, only three of these are likely to be affected by the trend toward fuels of higher vapor pressure and higher 90 per cent point. These are vapor lock, fuel tank and carburetor evaporation losses, and warm-up.

It is believed that specific engine and fuel system design changes can and should be made by the automobile industry to minimize the problems which could otherwise be quite disturbing to the motoring public. At the same time the petroleum industry has a definite and clear-cut responsibility to make possible these design changes by producing and marketing gasolines which do not show wide deviations in volatility. In this joint fashion, even greater reliability and higher performance than that provided by present day vehicles can be obtained.

(Turn to page 92, please)

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MITCHELL DIVISION — Philadelphia 36



(Continued from page 91)

### Series 2 Oils Pay Their Way in Diesels

By W. B. Brown  
Caterpillar Tractor Co.

**D**RAIN periods with Series 2 oil can be extended greatly beyond the present published recommendations for engines except where extremely abrasive dust conditions may influence crankcase contamination. In determining the degree of drain period extension consideration should be given to load factor, operating temperatures and fuel properties as variables of fundamental importance.

As compared to 2-104B oils Series 2 oils offer the operator: a. Lower wear and greater cleanliness resulting in increased engine life with consequent reduction in maintenance expense and down time more than offsetting a possible increase in oil cost due to the higher unit price of Series 2 oils; b. A greater assurance of long engine life at lower cost than obtainable with premium priced fuels and 2-104B oils.

### Ignition Problems in Damp Weather

By H. L. Hartzell and B. H. Short  
Delco-Remy, General Motors

**M**ANY measures may be taken to minimize the effects of moisture upon ignition systems that are not required to operate submerged or under heavy splash conditions. Listing these in the degree of their effectiveness, we consider them in the following order:

1. Replace braid - lacquer covered cables with Neoprene - covered cables.
2. Install tightly fitting durable nipples on all towers of the distributor cap and on the coil output terminal.
3. Install tightly fitting durable nipples on all spark plugs.
4. Provide adequate distributor ventilation.
5. Replace distributor cap and rotor with units having their contouring designed to minimize the effects of moisture.

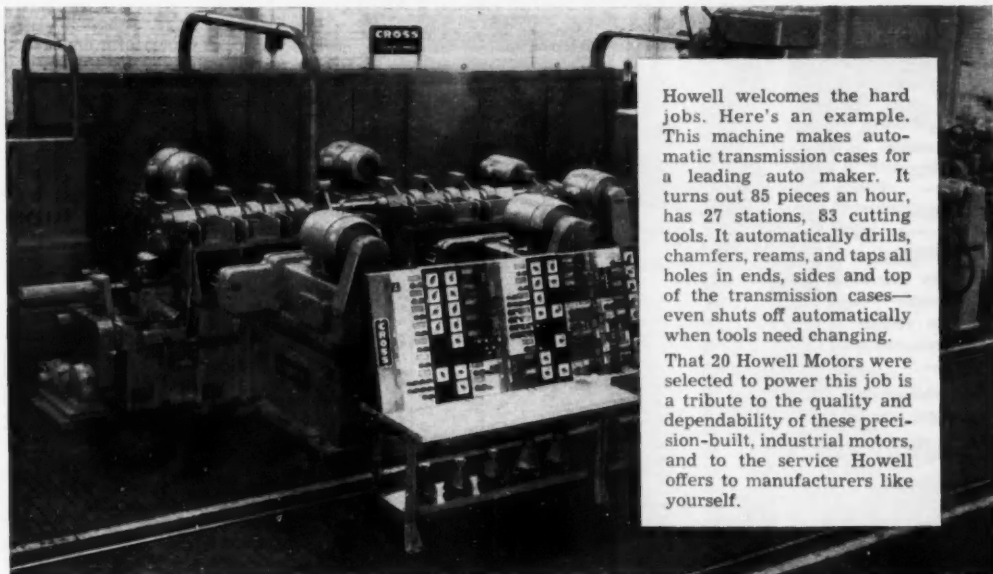
Where submersion or heavy splash must be considered, special designs should be considered.

### Minimum Energy Loss in Ignition Systems

By L. H. Middleton  
and M. F. Peters  
Electric Auto-Lite Co.

**A**UTOMOTIVE engine designers using higher compression ratios and valve-in-head engines to improve mechanical and thermal efficiencies are rapidly approaching the minimum performance requirements of present-day distributor and coil type ignition systems, making mandatory a re-study of

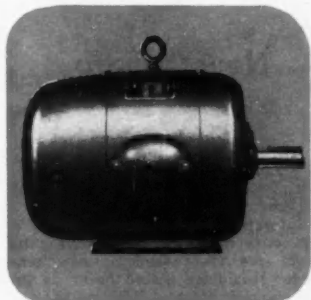
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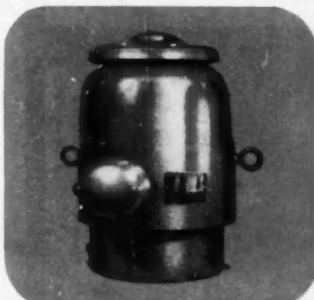
Howell welcomes the hard jobs. Here's an example. This machine makes automatic transmission cases for a leading auto maker. It turns out 85 pieces an hour, has 27 stations, 83 cutting tools. It automatically drills, chamfers, reams, and taps all holes in ends, sides and top of the transmission cases—even shuts off automatically when tools need changing.

That 20 Howell Motors were selected to power this job is a tribute to the quality and dependability of these precision-built, industrial motors, and to the service Howell offers to manufacturers like yourself.

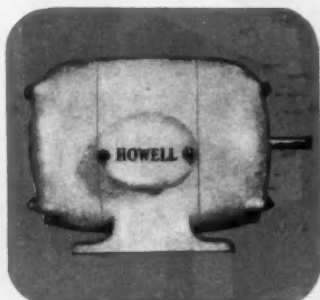
## Solution for . . . THE CASE OF AN AUTOMATIC TRANSMISSION



Howell Type K Motor. Offers constant performance in the presence of dirt, dust, fumes, and moisture. Sizes from 3 to 150 H.P. at 1800 R.P.M. Either vertical or horizontal mounting.



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the overall system effectiveness in order to bring about maximum utilization of the energy available.

The present primary current limitations imposed by the high speed primary contact breaker mechanism limit the total amount of energy available, and increases in top speeds of overhead valve engines reduces the duration of primary excitation to a degree where it has become necessary to substantially improve the efficiency of the overall system in order to meet these new demands. Unless a means can be found to justify the reduction of the so-called utility value of the spark, it will become necessary to increase the energy output by increasing the primary current, thus shortening the life of the breaker points and limiting the long-term usefulness of the system.

It has been determined that without increasing the primary voltage of the spark generator, the peak voltage of the secondary circuit when shunted by a fouled spark plug, may be increased without decreasing the probability of sparking at the electrodes, if the time of voltage rise is adjusted to reduce the energy needed in the utility component of the conventional ignition system. As the time approaches the optimum value, the peak voltage approaches a maximum value and becomes a maximum when the time of voltage rise has its optimum value.

## New DeSoto for 1951

(Continued from page 44)

placing the former clock spring with a coil extension spring.

Exterior styling changes include a distinctive new grille; a wide, sloping hood; new front fenders; new rear fender mouldings placed lower on the fenders; new Custom stone shield; and a belt moulding that completely encircles the car. The grille consists of nine curved vertical bars, which can be individually replaced if damaged.

Front and rear bumpers and bumper guards are newly styled. The front bumper is larger and heavier and is integrated with the grille styling; the rear bumper is designed so that it follows the contour of the rear fenders. It is also much deeper and heavier.

Visibility has been increased front and rear by widening the windshield, narrowing the front corner posts, sloping hood and fenders forward, and increasing rear window area by 88.7 sq in.

Interior styling improvements include a new instrument panel, finished in a brown oriental walnut grained metal. It is deeply skirted and sweeps down almost to the floor. A map light has been added. The steering column is completely shrouded to the toe-board.





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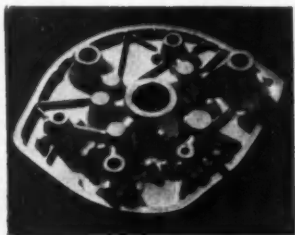
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## NEW PRODUCTION AND PLANT EQUIPMENT

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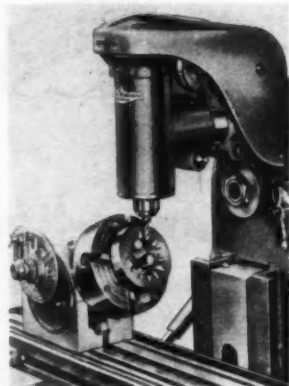
(Continued from page 66)

sure, hand operation of the quill is said to be so sensitive that the operator can easily feel a  $\frac{1}{8}$  in. drill feeding down in the work. A light aluminum bearing cage holds the balls in place in a staggered distribution which provides practically a complete bearing around the circumference of the quill.

Another added feature contributing to operator convenience comprises new design depth measuring controls. A built-in dial indicator, which reads to 0.0005 in. and can be adjusted to any position of the 9 in. quill travel, replaces the old type depth measuring indicator which clamped on the quill.

An adjustable pointer can be set to zero on the reference scale regardless as to what position the quill is in, thereby showing the operator at a glance the depth he is boring. A binder for locking the quill in any desired vertical position for milling operations is located at the front of the spindle head. A depth stop can be set to repeat a depth position anywhere in the full travel of the quill.

### B-18—Vertical Mill Attachment



New improved streamlined vertical mill attachment, put out by Marvin Machine Products, Inc., Detroit, Mich., provides safety for the operator by means of a protecting hood over power transmission parts.

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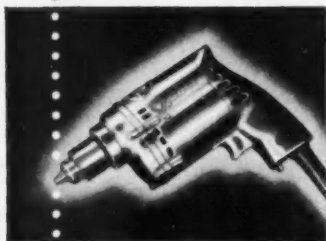
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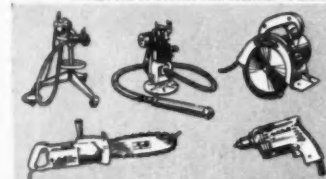
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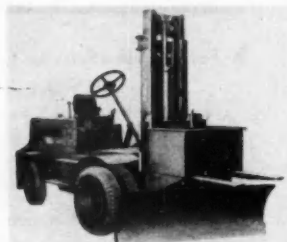
(Continued from page 72)

against chip-loading, galling actions and heat wear. Friction is stated to be reduced 12 to 20 per cent with the combined use of the Chromaster and Chromasol.

### C-43—Fork Truck Snow Plow Device

A snow plow for all Clark pneumatic-tired fork-lift trucks of more than 1000-lb capacity, has been placed on the market by the Industrial Truck Division of the Clark Equipment Co., Battle Creek, Mich.

Readily detachable, it requires no tools to mount, dismount, or to adjust the blade. In attaching, two channels on the plow are placed to receive the standard forks of a lift-truck. Two "T" bolts, which can be turned by



Clark fork truck snow plow device.

hand, fasten the plow to the forks. Above the channels is a ballast box which may be filled if the plow's weight of 400 lbs does not make sufficient contribution to traction requirements.

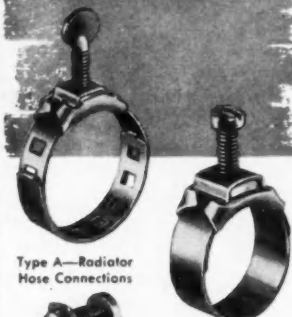
Mounted to ride below the forks of the lift-truck, the plow is secured to the back plate of the attachment by a mounting which allows it to pivot in two directions, compensating for uneven running surfaces. It is held in operating position by spring tension, which allows it to pivot backward when obstructions are met. The 22½-in. blade may be set at an angle from the front of the truck in any one of six positions. It is designed with a curvature to prevent a vacuum behind to accumulate snow, and the blade shoe at the base is hardened steel to insure long wear under severe conditions.

To operate the plow, the truck pushes against a vertical support plate and two pushing blocks which rest against the base of the upright assembly.

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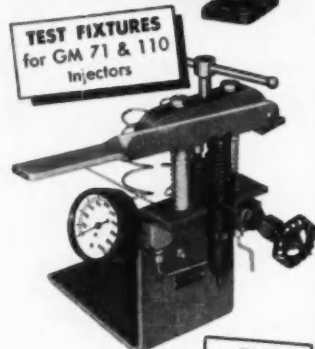
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## Studebaker V-8 Engine Plant

(Continued from page 48)

the Cincinnati mill is fitted with an indexing table holding two manifolds, one station being for loading and unloading. The milling head has three cutters which take the roughing cut on the manifold pads as the work is indexed around. At 90 deg past the milling head is a small stationary surface broaching station for finishing the pads with a cemented-carbide broaching tool.

Unique feature of the W. F. & John Barnes transfer machine is the provision of a pair of parallel rails for transferring work from station to station. Thus each cycle completes two manifolds and each station of this short unit has duplicate heads for handling two work pieces. In addition to the variety of drilling and tapping operations performed in this machine, an angular pad is milled with angular heads at the side of the station.

The entire crankshaft line is new, and features the latest models of the familiar LeBlond crankshaft lathes, and Landis grinders. Oil hole drilling is done with Leland-Gifford drills, the operation requiring four separate machines, each one having two stations. An interesting feature of the Leland-Gifford equipment, differing from conventional practice, is the provision of what may be termed "open plumbing"

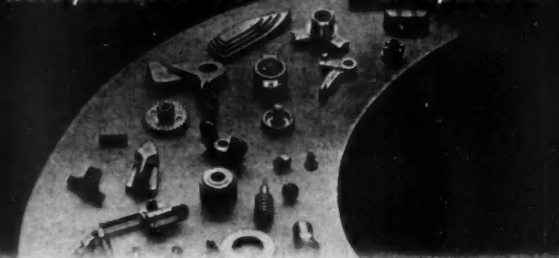
with all hydraulic lines individually manifolded outside the machine for easy servicing in accordance with JIC standards.

The connecting rod line bristles with new equipment and techniques. One of its features is the latest version of the familiar Footeburt continuous surface broaching machine which is tooled for broaching the half-bore in connecting rods and caps. The parts are fed by hand into the automatically clamping fixtures at the loading station. At the present time this machine has an output of at least 600 pieces an hour but apparently productivity is limited only by the speed with which work can be loaded. Incidentally, the machine boasts an individual Hapman chip conveyor, running the full length of the machine, picking up chips at the front end and transporting them to a hopper off the rear end.

Another outstanding piece of equipment on the connecting rod line is a new type of balancing machine developed by Snyder. Although it appears conventional to the eye, its uniqueness lies in the fact that the weighing of both ends of the rod and the subsequent measured amount of metal removal is a completely automatic operation with the

(Turn to page 102, please)

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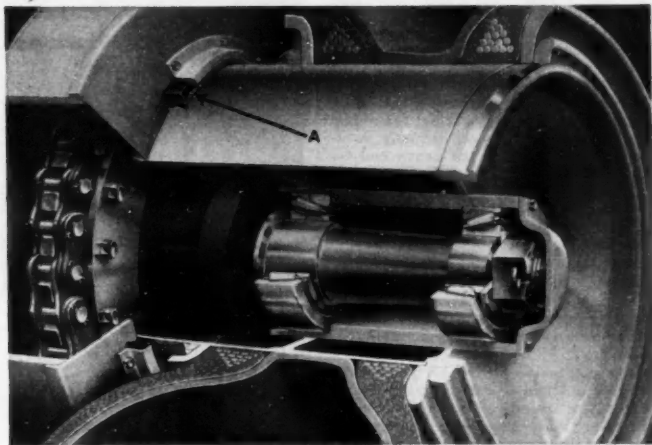


Figure 1. Wheel drive assembly

## Large, two-segment National Syntech\* Seal serves dual purpose on heavy-duty earth mover

Exclusion of dirt and dust from vital mechanisms is a continuing problem to designers and manufacturers of earth-moving equipment. National Syntech Oil Seals have repeatedly shown their adaptability and reliability by turning in long-term, zero-leakage performance on such equipment—despite the most rugged abrasive conditions.

One application—a heavy-duty earth mover—is of particular interest because of the very large Syntech seal involved. The six-foot-high drive wheels are mounted on a drum approximately 25" in diameter. Power is transmitted to the

wheels through a chain drive operating within a large chain case. The problem is to provide an effective seal between the drum and the chain case (A, Figure 1). Zero-leakage sealing is necessary to



Figure 2. National Syntech 6250 Seal

retain bearing lubricant as well as exclude heavy concentration of dirt, dust, rocks and mud.

National Oil Seal engineers solved the problem by designing a special two-segment seal which bolts to the chain case (Figure 2). The sealing member is molded of Syntech synthetic rubber to precise dimensions. Two minimum-drag sealing lips provide dual-direction sealing. "Flex" sections in each sealing lip insure positive contact with the wheel drum even during severe shocks encountered on rough terrain.

In the above application, a special National Oil Seal design was required to meet unusual conditions. But in many cases—particularly when a relatively small production run is scheduled—manufacturers can take advantage of stock oil seal designs. In such cases there are no tooling costs and no lost time. National Oil Seals are available in thousands of stock sizes and shapes, and tools and dies for many thousands more are maintained. Whether you need a special design or can employ a stock number, National Oil Seal engineers are ready to help you.

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**MOLY**

end-milling cutter heads instructed by electronic control. The only function of the operator is to load the rod in the fixture. Two Shadograph scales, one for each end, indicate the weight, tell the operator how much metal must be removed. When the starting button is pressed, the carbide tooled milling heads move rapidly into the work and remove the exact amount of metal from each boss according to instructions transmitted electronically.

In preparation for this machine, all light weight rods are screened and rejected. In a few cases where there is more than average metal removal indicated at one end or the other, the operator cycles the balancer initially so as to remove excess at the heavy end before the machine is cycled to balance-mill both ends.

It is of interest to maintenance engineers that Studebaker specifies the installation of the well-known Farval automatic lubrication system on all transfer machines. Not only does this assure a stated lubrication schedule, it also provides a standardized management scheme conducive to maintenance economy.

As mentioned in the earlier article, engine assembly is arranged to start directly at the end of the cylinder block machine line. The block is mounted initially in vertical position on the stand to facilitate the assembly of major internal elements. At the end of this line, engines are transferred to another assembly line for installation of external parts and accessories.

Later on engines are transferred from the main assembly line directly to the block test. Upon being accepted, engines go to the dress-up line on a large merry-go-round conveyor for installation of transmissions and for finishing touches for the final car assembly line.

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## Men of the Industry

(Continued from page 25)

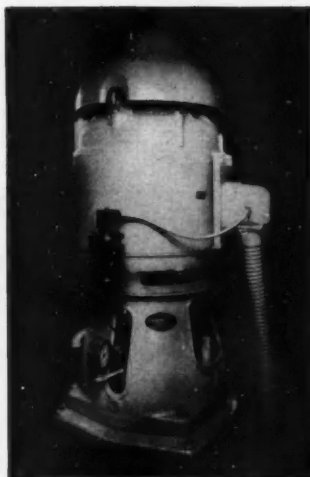
Budd Co.—Earl C. Blaine has been appointed plant manager and Robert J. Kalbfleisch assistant and works manager of the Hunting Park plant in Philadelphia.

Automatic Transportation Co.—Appointment of George A. Hinckley as sales manager of the company's New York City factory branch office was announced.

Luscombe Airplane Corp.—T. F. Riddle, most recently factory manager for Huey & Philp Co., Dallas, has joined Luscombe Airplane Corp. in a similar capacity.

Pacific Airmotive Corp.—William J. Power has been appointed manager of material control and purchasing.

The Four Wheel Drive Auto Co.—Wm. Hanson has been appointed manager of a newly-created Market Development and Research Dept.



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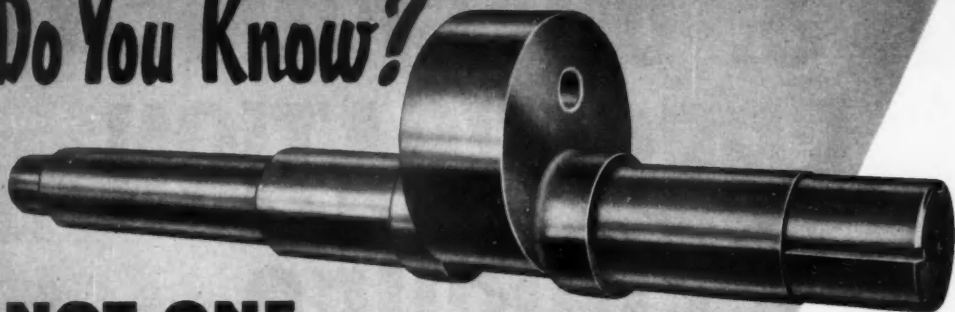
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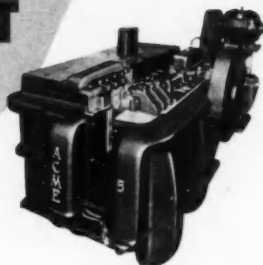


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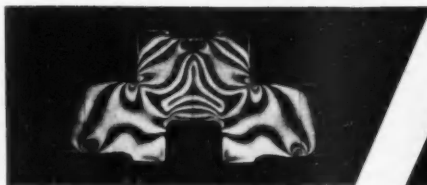
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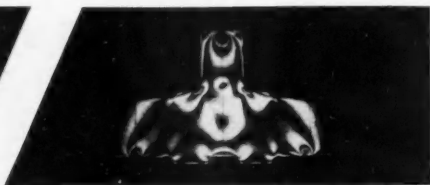
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CRANK TYPE STRESS ANALYSIS



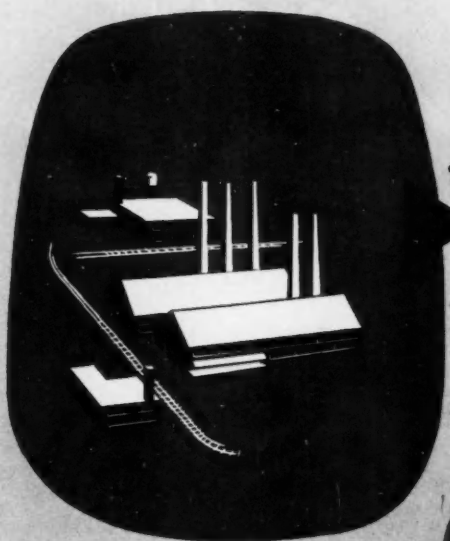
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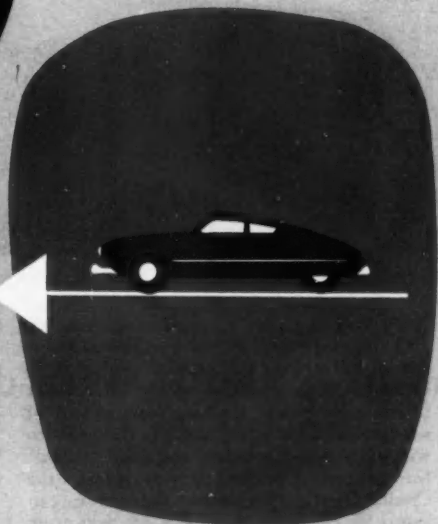
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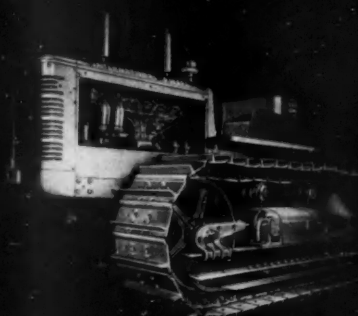


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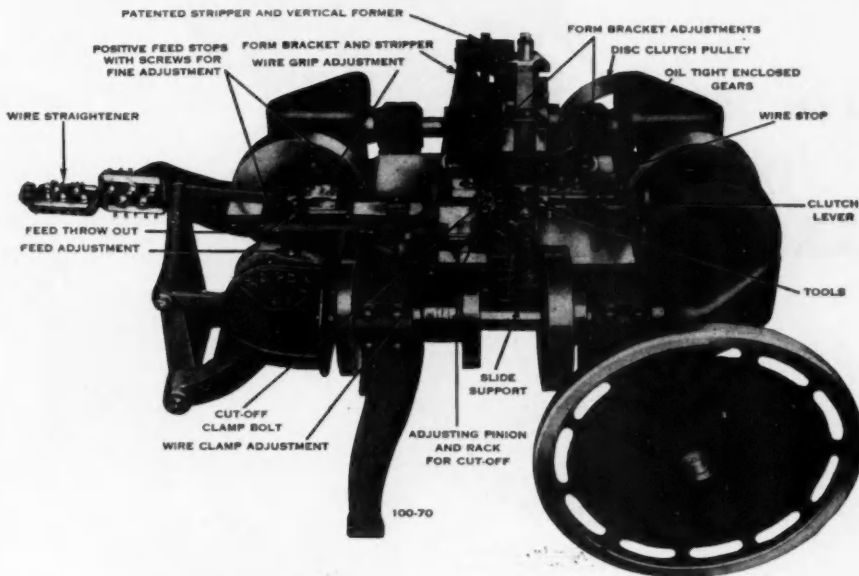
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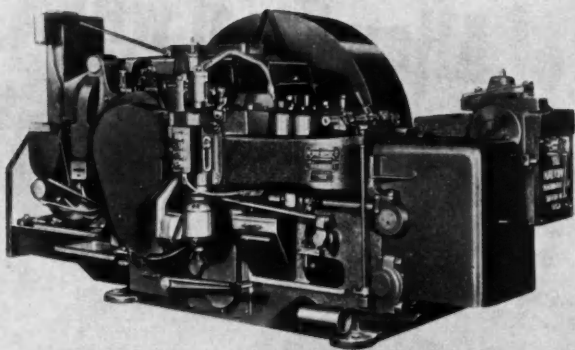
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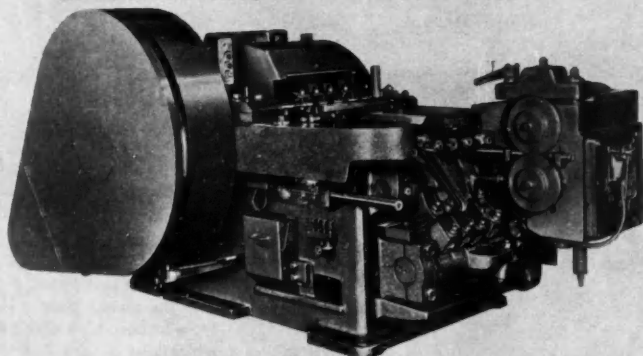
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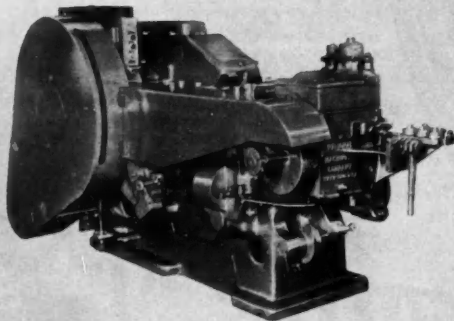
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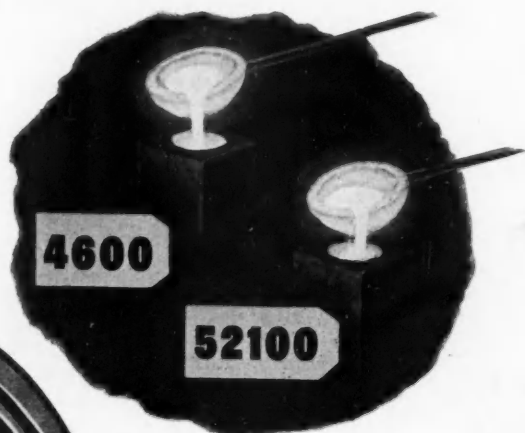
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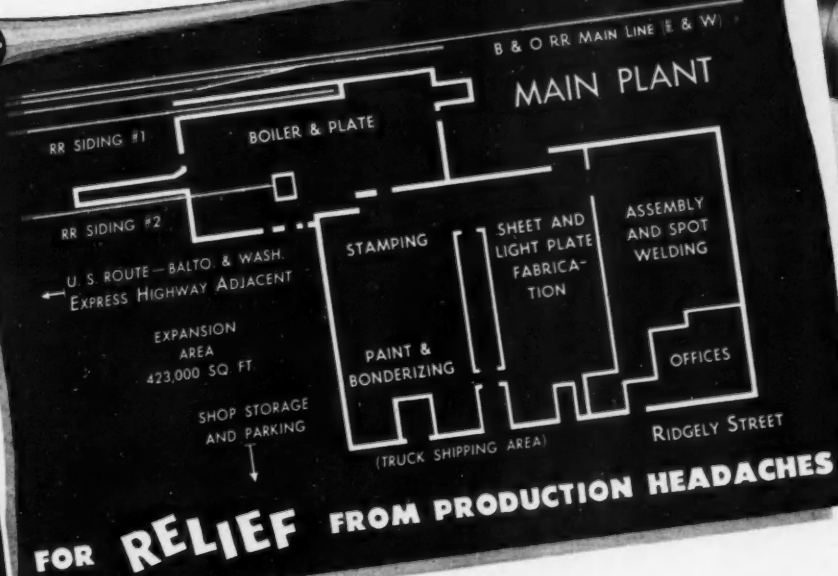
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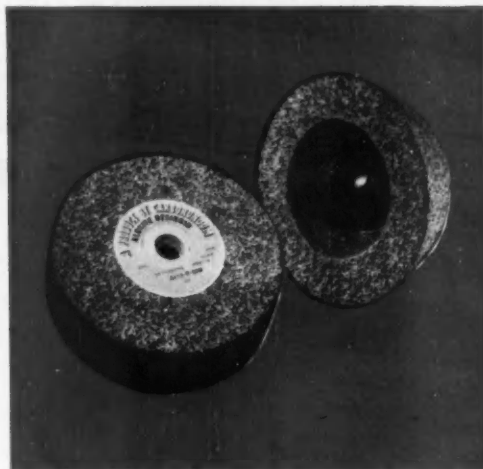
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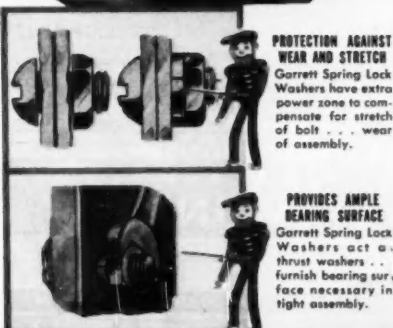
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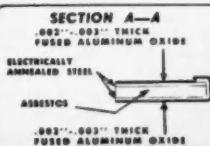
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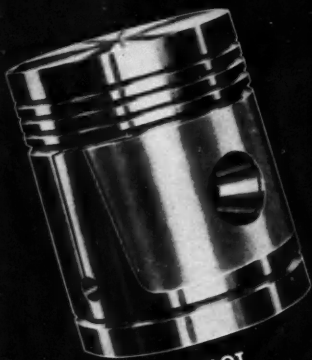
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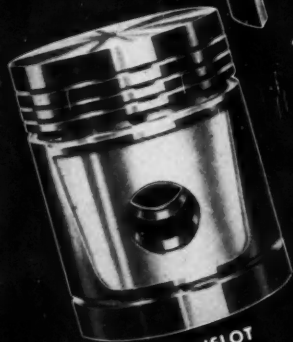
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